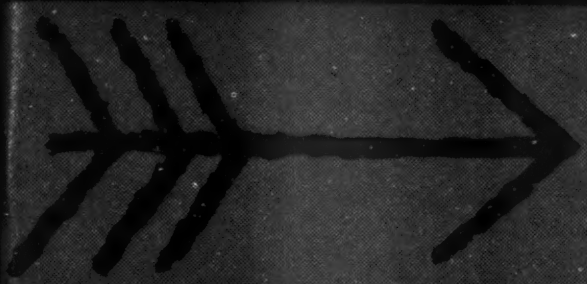
TRENDS IN EDUCATION



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Modern Approaches to:
History
Languages
Creative Writing
Zoos in Education
Crafts in the Middle Years
Supply of Teachers
Comparative Education
French Teaching Methods
Educational Research

JULY 1972

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Modern Approaches to History and Languages

Subject labels such as 'history' or 'languages' are convenient tags by which we have in the past identified certain aspects of human experience. In humanities courses history becomes part of a much wider study of the past in terms of the present; language teaching becomes part of social studies when the cultural background of a country is taken into account.

History Teaching Today

P. COLLISTER

P. Collister is an HMI in the Eastern Division of HM Inspectorate.

There is evidence here and in other countries of dissatisfaction with a narrow field of national history, of a desire for the relevant and contemporary, of a search for ways of involving pupils at first hand in the stuff of history. All this has led to experiment, research and innovation which it is the purpose of this article to outline.

First, it should be noted that there is now a wealth of combined-subject history degrees at universities both old and new. Their great virtue is that they encourage the student to think seriously about the relationship between history and other subjects; they also make it less likely that he will move unimaginatively along a groove which he carved out for himself (often for no good reason) when he began to specialise in history at his secondary school. Common in the new universities, but also available in several older universities is the 'integrated' combined-subject degree, which had been specially designed as a whole, but prescribing the balance between historical and other subjects. Examples are the mediaeval studies degree at St Andrew's, the renaissance studies degree at Birmingham, the degree in social and economic history at Kent. There is also a tendency in some universities to reverse the chronological order. Kent historians, for instance, begin with a compulsory study of 'Britain in the Contemporary World', and only from term five do they take courses in earlier periods of history. At Warwick the first four terms are devoted to the study of 'European and American History from 1776' and thereafter students move back into the study of 'Europe and Expansion Overseas 1200–1660'.

Anthony Peck is organiser in the German section of the Schools Council Modern Languages Project.

Turning to the schools three factors now combine to present a changing situation. First, the examination boards are experimenting with new optional syllabuses; some in regard to content, such as the introduction of world history, and others with reference to method. One board, for instance, has instituted an optional project to be undertaken by the students, over a period of time, and another has introduced a paper demanding the interpretation and analysis of original documents and sources.

Secondly a new type of sixth form is emerging, many of whose mem-

bers are there, not as part of a necessary preliminary stage in the traditional move to university, but for the educational value of a sixth year at school, or to repeat 'O' levels, or as preparation for further education and training.

Thirdly, there is the increasing historical element within courses of general studies, taken by sixth formers as a counterbalance to specialisation. Consequently although many grammar schools still continue to feed their pupils on a conventional diet of good solid English and European history, utilising well-known standard texts and reference books, and although this continues to be acceptable, when spiced with informed comment and discussion, many teachers are aware of its limitations for the new sixth former, and new syllabuses are being introduced, incorporating sometimes world history, sometimes local studies, often undertaken by a team of teachers. Some topics introduced in one grammar school provide examples of a thematic approach to local studies in the third year—the Jews of mediaeval Norwich, the Norwich charters of the 15th century, Kett's rebellion, Norfolk theatres, Norwich inns, Norwich boys' schools of the 17th century, Norfolk poachers, the history of the Midland and Great Northern railway, Norwich shoe making, the Yarmouth herring trade, and many others. These boys then return to the main stream of English and European history in the fourth and fifth years, and modern England and Europe in the sixth form.

Content

The Certificate of Secondary Education has made an impact on the syllabus and on methods of examining in history. It provides a variety of types of questions and less emphasis on the essay. Above all there is the student's own project, and course work. Context too has widened, and many pupils and teachers opt for papers on the modern world, with an emphasis on contemporary problems and their historic roots.

In many schools the syllabus still follows a traditional pattern: first, the study of the ancient world (which has sometimes been done before in the primary school), and this is followed by a fairly narrow regime of chronological English history, with Europe and America and Asia only touched upon as they dared to impinge upon the story of Britain. Two periods a week are allotted to this and the demands both of chronology and the alleged need to cover the whole ground entail a fairly superficial skelter over the surface of English history.

In a number of schools, however, there has been a move towards an integrated curriculum for the humanities, and projects based on thematic studies. Some of these schemes have been interesting, but the danger is always that the historical content, and exposure to original sources, will be even less than in even the most conventional scheme of history teaching. Nevertheless whether within the orthodox framework of a subject called history, or whether it is in a scheme of social studies, or humanities, there is, up and down the country, an educational pattern of infinite variety, in which the teacher is free to select his syllabus, and examination dictates are lessening, with changes in their structure.

Changes in content have, inevitably, indicated new approaches and the acquisition of new skills: in order to study the documents of, say, the 17th century, some experience is needed to interpret 'the secretary

hand': in order to study demographic history some knowledge of statistics is required: to interpret aerial photographs, in a search for lost villages or settlement patterns, some elementary stereoscopy is essential. Equally important, however, in the development of new methods, are the organisational reforms within schools, as a result of which the teacher is often faced with a class that is far less homogeneous than before, and he can no longer rely on the old methods of exposition, essay writing and note taking when he has a class whose abilities cover a very wide range. Obviously there must be a common core, some retention of the story telling element, and a pooling of knowledge, but thereafter much depends on organisation within the class, of group work, of the development of themes peripheral to the main one, of individual projects and assignments appropriate for all abilities.

Such methods of working are in keeping with the changes in primary schools. Here the historical experience is often provided by a study in depth of personal topics, or by class projects, using a variety of reference books, and incorporating all the skills and media. There are the dangers of lack of any obvious progression and continuity, there is a hit and miss element in the work, very often we have merely exchanged the old copying from the blackboard for copying ill-digested chunks from a reference book, and however prettified and packaged in attractive folders, the validity of the experience remains as limited as the old note taking. Nevertheless for many children the spark of historical interest is lit once and for all by their teachers in junior schools.

In a very small village school, for instance, the children one day noticed that the heraldic devices on the roof of the nave in their local church matched those on some of the tombstones. From this they were able to find out the names of the families and paint their coats of arms. From this they went on to a general study of heraldry, and this again led to a great deal of imaginative and creative work on a factual basis.

One aspect of history, which is being increasingly undertaken by junior schools is family history, and one or two schools—particularly one in Wigan—have been pathfinders in this respect. Children are encouraged to bring from home photographs, letters, documents, school leaving certificates, employment cards and so on, and in a close knit area such as Wigan, it is surprising how detailed a picture can be built of social life and employment, just from the children's own sources, and to what unsuspected areas such work can lead.

Valid Experience

What then are the chief problems that face teachers of history? Whether they are class teachers in primary schools, for whom historical experience is only one aspect of an undivided whole, whether they are non-specialist teachers in the lower reaches of secondary schools, specialist teachers of history, or teachers of integrated studies, probably the greatest problem is that of selectivity. Out of the whole spread of human experience how can we select those areas that are going to be most relevant to our pupils' needs and to assist them to overcome the prejudices of the wide world outside school? If we select the small thread of our national story with which so many have been content for so long, we shall be doing our pupils less than justice. Of course they need to know the highlights of the national heritage and how their own particular locality can reflect great events—(most English parish

churches can illuminate the national story: witness for example the lists of rectors and the many changes between the years 1641–1649). Our pupils must know something of the great giants of the modern world—of the USA and Russia and China, and how history has shaped them—they must know something of great crises and heroic ages. Teachers must decide for themselves what is most relevant and important but if they start with a clear scheme and are ruthlessly selective, less like a cross-country runner jogging steadily from point to point, and more like a potholer probing the depths, then whatever history is done will be an exposure to valid experience. The difficulty lies in the nature of the content. The insipid and sometimes inaccurate generalisations of the text book are not valid, the copying of chunks from the reference book is not valid. Only the first-hand is valid—whether it is the inspired story telling of the teacher, for which there is still a place, or drama, or poetry, or subjective writing, or study of original or photostat documents, or even the reading of historical novels, or aerial photographs, or tramping the fields and experimenting with Professor Hoskins' hedge dating theories, or plotting the course of a barge load of limestone from its Midland source to its East Anglian church, or studying village records—all these and many more are valid forms of historical experience.

What matters is that the historical experience is real and sharp and vivid. In many primary schools there is no longer a subject called history in the time table, but the historical experience of the children may be no less real.

History teachers are becoming aware that they are no longer classroom teachers anchored to their desks. There is a great variety of material indoors and out that they can use: films, slides, film strips, gramophone records, and radio and TV (both BBC and ITV have a fairly extensive history coverage for all age groups)—these are all grist to the history teachers' mill.

The teacher needs certain essential tools; a fixed base, with reference books, photographs, maps, archive materials, and plenty of display boarding on which to present them; good storage; a showcase, where exhibits can be regularly changed, a projector, and blackout; this is the physical setting and the necessary hardware, but far more important, he needs to see history not as an accepted body of fact revealed to him for all time when he was at school or College, but a discipline whose frontiers are continually being extended, and whose interpretations change from year to year.

Teach Language, Teach Culture

ANTHONY PECK

The idea that the English are no good at foreign languages because of some native deficiency, while other nationalities—the Swiss and Swedes for instance—are born linguists still persists in our mythology. The simple answer to this is that individuals in countries with minority languages are highly motivated to learn the languages of others.

Now we too are placed in a situation where for practical reasons we need to learn the languages of our European neighbours. The learning of each other's languages can promote a greater understanding between peoples and help combat racial prejudice. As Edmund Leach said in the 1966 Reith Lectures:

> If Mr X is someone with whom I cannot communicate then he is out of my control and I begin to treat him as a wild animal rather than a fellow human being. He becomes a brute. His presence then generates anxiety, but his humanity releases me from moral restraint. The triggered responses which might deter me from violence against my own kind no longer apply.

It seems to me there are eight areas of cultural background of value to students beginning a language. The first of these is the physical environment of the country seen in a contrasting way to the student's own. This helps to make the country much less strange when it is visited for the first time. It helps moreover to remove those barriers which hem in the inexperienced traveller and make him feel ill at ease, far from home and foreign. The sort of information which one can provide for students under the heading of a description of the foreign environment are pictures of postboxes, fire alarms, police stations, posters and street signs, visible sources of information, such as the signs for 'Ladies' or 'Gentlemen', timetables, particular sorts of shops; visible sources of particular functions, such as policemen's and postmen's uniforms, the uniforms of employees of particular airlines or travel associations. Pictures of food, recipes and methods of preparation can prepare students for that most shattering cultural shock: *Sauerkraut*. Pictures of interior furnishings and the layout of houses and flats, various sorts of clothes when these differ in style from clothes in this country can help to diminish the foreignness of the domestic environment. In attempting to give students a picture of this kind, it is, of course, impossible not to be selective to a great extent. It is, however, important to give as balanced a picture as possible and not to give a vision of the foreign country which is in any way quaint, gothic or picture-postcard-like.

Students who understand something of the formal patterns of the culture whose language they are studying can try to learn how to align their own behaviour with that expected by the foreign culture. Knowing how a foreign society functions on formal occasions helps to avoid clashes, disappointments and culture shocks. The formal patterns which I have in mind are those associated with engagements, weddings, birthdays, Easter and Christmas ceremonies, carnivals and fêtes, ways of applying for jobs, methods of voting and taking exams, ways of entertaining relations, friends, acquaintances and colleagues. It is also possible to learn prescribed forms of behaviour between, for instance, pupils and teachers, employers and employees, guests and hosts. All these structures of behaviour can moreover be compared with the native culture. The study of such patterns helps to make the formal life of the foreign language community more meaningful to the student.

A study of the influence which society exerts on its individual members can help a student to grasp how a society functions informally and this in turn is an aid to understanding what foreigners say and do. The sort of pressures I have in mind are those which can be described by asking what a community expects individuals to think, to believe, to wear, resent, laugh at, defend, admire, disapprove of, praise, blame,

endure, honour, fight for, worship, encourage or condemn. It is also possible to study how urges are diverted into socially approved channels. What sort of behaviour, for instance, is expected at parties or football matches? What sort of behaviour is expected at political demonstrations? Which jobs are available and which jobs carry prestige also shows the influence society is exerting on the individual. One can study moreover the ways in which a community persuades and coerces individuals to conform to an accepted code of behaviour. Without understanding such pressures, one cannot understand the significance of what one hears nor how what one says oneself will be received.

By learning something of the attitudes individuals have towards their society, one can understand the values which groups of people share and this is in turn an aid to making contact with members of that community. One can study, for instance, what individual members of a society think of manual labour, punctuality, trade, the importance of sport or social mixing, the value of courtesy, their attitudes to racial problems, beauty, old age, authority, the opportunities and rewards of employment, pleasure, good and evil, leisure, sex, sexual emancipation, divorce, civil rights, friendship, youth, degrees of wealth and poverty and privacy. One can study what individuals think of the educational opportunities which are offered by a society or the opportunities for promotion or the opportunities for assuming responsibility. One can find out what individuals think of the degrees of social security and health security offered by a society. One can find out whether individuals accept or reject the normal rules of politeness or of dressing. One can study how individuals react to school rules, home rules and other such codes of behaviour. One can find out whether individuals consider it to be more important to have one good friend or many acquaintances. By understanding something of the individual's view of life, one can begin to grasp what it is like to be a member of that speech community. It is a way of appreciating the other person's point of view. It is moreover most important to know something of the individual foreigner's attitude towards his *own* society if there is to be any meaningful communication at all, except on the most superficial level.

Rôles

The second group of categories we might call rôles in society. Adolescents need to develop away from their parents, away from their home and to establish their own character and personality. They need to become individuals and to discover their own self. The manner in which young French boys and girls and German boys and girls tackle these common problems and achieve their own independence is, therefore, a content area for language teaching which informs the student about the foreign culture and is most likely to find an echo within his own experience. The sort of problems met by all adolescents of European origin, at least, and the ways in which they develop their personalities can be studied by looking at: their hobbies, the age at which visits to cinemas and theatres are permitted, the age at which decisions about clothes can be taken, problems associated with learning how to get on with parents, grandparents, brothers and sisters without losing one's own independence, problems associated with friends, such as whether one should invite friends home, if so, how one should entertain them, problems associated with coming to terms with oneself, such as trying to learn about one's own pleasant or unpleasant

characteristics, finding out whether they can be changed, questions about whether one has an ideal of behaviour towards which one works, whether one has heroes, what one would like to be admired for, problems associated with how one can develop and influence one's relationships with teachers and persons in authority, the question of whether one should accept trust or justice as a basis for the relationship between teachers and pupils, the question of whether one should set an example to other people. These problems and many others give an interesting and important picture of a foreign culture and the ways in which young people develop as members of society.

Then there is the sexual rôle. By this I mean the ways in which young people learn how to be men and women. All young people need to consider their relations with the opposite sex. Most of them will marry. All of them will certainly think about marriage. The way in which they think about members of the opposite sex may be unconscious, it may be irresponsible and superficial, but the development of this side of one's personality raises for all the following questions: how and at what age should one be allowed to get to know members of the opposite sex? When are unsupervised cinema visits allowed? What is the most important factor in making a happy marriage? How can one tell when one has found a marriage partner? What is the right age for marriage? Which characteristics does one hope to find in a husband or wife? Does one want to have children? What is the minimum of material possessions necessary before marrying? Must one have a certain salary, for instance? Should wives work? Do men or women have particular rights, responsibilities and privileges? Should men and women receive equal pay for equal work? The opinions and attitudes of foreign adolescents to questions such as these give a picture of a culture and show how young people of different countries develop their rôles as men and women.

All young people at some time or other must prepare to earn a living. Equally, everyone has to choose a career or a trade or an occupation. The choices which are available to be made constitute a segment of a culture. The sort of questions and problems facing young people are as follows: how much pocket money does one need? What must be bought with it? What proportion should be saved? What value does thrift have? What ambitions does one have? What occupation shall be taken up after school? How is the choice to be made? Who is to give advice? What educational standard is required? What apprenticeship or professional training is necessary? Is what one learns at school a good preparation for life afterwards? Which trades and professions carry prestige? Is it necessary to go on to further education or day release or block release or evening school in order to equip oneself for the future? Is it worth the trouble? What are the prospects? What is the pay likely to be? How is one helped and guided at the beginning? What are the prospects for change if one's first choice turns out to be wrong? By studying these aspects of a foreign culture, one not only learns about the foreign community and the problems of one's peers, but one also gains insight into one's own situation and that of one's friends.

In the moral rôle each person has to take on responsibility for his own views, attitudes, opinions and actions. Society gradually withdraws the buffers between one's own actions and one's responsibility for them. As this happens, each individual must develop a position, an

attitude or a stance towards a variety of problems. Should one smoke? Should one drink? Should one take drugs? What does one think of people who drink and drive? Which crimes are most serious? Which crimes are least serious? What is the right punishment for the most serious crimes? What does one think, for instance, of skinheads, students who occupy university buildings, hi-jackers? Why is there a generation gap? Should one give to charity? Can one, and should one do anything about people in underdeveloped countries? Who is the most famous man or woman one has ever heard of? What is it that makes him or her admirable? Does one have an ideal or hero? Does one believe in God? Does one go to church? What is the good life? How should one treat other people? Can one be satisfied with society as it is? What should be changed and how should one go about changing it? Questions such as these and the answers which an individual gives to them constitute a world view. By learning about the world view of young foreigners, one not only acquires an insight into their lives and their culture, but students also have their attention drawn by example to areas of decision which they might otherwise neglect.

This second group of four areas of culture, each of which contains a content area which can be presented in the context of foreign language teaching, raises a number of side issues. Whereas the first four areas of culture were described with the help of sociology, this second group requires the help of psychology. The description of these four areas of culture is again an interdisciplinary study. Another point to note is that this second group tends to show the similarities between the native culture and the foreign culture, and they therefore act as a balance to the first four areas which take the standpoint of emphasising differences. The eight areas mentioned form part of an interdisciplinary study involving the language specialist, the psychologist and the sociologist. In this way the vocational, educational and idealistic aims of foreign language teaching can begin to be met.

Trends 24 carried a survey by HMI about the provision of books in primary schools. This article develops the theme of the creative use to which these books might be put.

Books and Writing

JOAN CHRESESON

Jean Chreseson is a member of HM Inspectorate and works in the North Western Division.

A recent article in *Trends* has demonstrated that schools of all kinds are better off in book provision than they have ever been. It has also demonstrated that having books is only the beginning of the story. When a collection of books has been built up, the main problem in any kind of school is how to bring pupils and books together at right moments, and in ways that are fruitful for the learning process. A glance at unblemished date-stamp pages and the pristine freshness of text and cover which characterise some school library stock proves what we all know: that some books never find their way into any hands for any purpose. Which says something not only about how books are used or not used, but maybe about how they are selected, where they are stored, how their use is organised, and even about the total educational philosophy of the school in which they are kept.

Once the skills of reading and writing have been acquired, book resources are used at all levels in the production of writing by pupils. From the infant school onwards, it becomes a major industry. The development of individual and group work, especially in primary schools, but increasingly also in secondary schools, coupled with most schools' increased book collections, is accelerating the trend towards even more written output. It seems possible to identify some inherent characteristics of this activity right across the educational scene, though it takes some specific forms in the primary and middle school.

Many primary schools are well supplied with the books which are an essential aid to approaches based on children's individual needs and interests, and whose emphasis is on learning through personal experience and discovery. In primary schools are often to be found the best conditions for the use of books. They are about the classrooms, spilling into corridors and book-corners, and less often than in secondary schools isolated from ready use in formal libraries. The divisions between 'subjects' are less rigid and defined, and fact spills comfortably over into fiction. Many of them, most in some primary schools, are information books, and they are most generally used in the production of some kind of writing.

This compulsive urge for written output might be questioned. Are we always clear about our objectives? Are headmasters and the Inspectorate partly to blame in that they for ever ask to see 'the written work'? Do class-teachers aim to check up by this means on what the children have read and understood? Is it something tangible to show the parents? Is it a strategy to keep the class quiet and occupied? Perhaps a better way of assessing comprehension would be to devise more formal and informal situations for talk rather than for writing. The

physical labour of writing at early stages may even produce an anti-learning device. 'We'll have to write about it tomorrow' has been known to take the gilt off many a piece of educational ginger-bread.

Project work is almost universal. At its most unstructured, the project may be a random subject chosen by the child or the teacher, 'chosen' sometimes because books, or more often a book, on the subject are available in the classroom or at home. The subject boxes provided by school library services may also impose unrealistic limitations, as mentioned in the *Trends* article. Folders or books are produced containing pieces of writing, pictures, diagrams. Sometimes a group of children pool their output. The more literate write, the less secure draw. A class topic may lead to the work having more relation to other activities, but the basic output remains the same: a collection of mainly descriptive, derivative material, the written parts of it often laboriously copied from book and other printed sources.

There often seems little attempt to make the exercise a validly referential one. Even young children could be asked more often to solve problems by their use of information books than to retell content. The use of more than one book source can help children not merely to repeat information but to assimilate and use it by selecting and organising what is relevant to their purposes. This might involve a more limited but a clearer definition of objectives, and a closer structuring of activity.

In the lower classes of secondary schools or in middle schools, pupils in library periods can be observed copying from books, which may scarcely be worth reading. Integrated studies programmes and forms of classroom organisation geared towards individual work sometimes amount to little more than the provision of books, or a book, and the subsequent copying of text and illustration. Problem-solving within a devised syllabus, requiring an appropriate element of selection and synthesis by the pupil, produces more meaningful written output. If the problems are carefully devised, useful practice in writing in a variety of appropriate modes may also ensue. Any kind of individual programming at any stage in the junior or middle school carries with it the need for carefully selected reference and information resources. Structuring by the teacher is also needed, but not the kind of structured work which demands descriptive answers to factual questions. When related to experience, synthesis and selection are qualities which writing derived from book resources serves to develop even at early stages.

There seems a need for teachers to look more closely and critically at the language of information books. At best it is wasted time for a child to copy out language which is meaningless to him. If he is acquiring by practice and imitation the ability to write in a variety of formal modes, as is sometimes claimed by teachers, then it is important that his models should be valid ones. A book called *The Coming of the Dinosaurs* is found in many primary classrooms: I have read half-a-dozen folders on Dinosaurs, a popular subject, which have begun: 'No prehistoric animals have become so famous or so notorious as the Dinosaur. As a bogey in the nursery, a jest for schoolboys, or a useful label for the inventions of pseudo-scientific writers, the Dinosaur has been invoked by all and sundry since its original discovery.' No wonder that some of the children opt out of the verbal medium at that point, and turn to drawing.

Some of this empty pedantry may be skipped over harmlessly enough in reading; it might prove more than a waste of time to copy it out. Teachers responsible for choosing books and promoting their use by children must be linguistically equipped themselves, or at least sensitive towards the appropriate uses of language. The variety of language quoted seems often to characterise the *non-information* book, a book which hovers uneasily between fact and fiction, which is marked by neither accuracy nor creative imaginativeness, and which makes up for these deficiencies by patronising its young readers.

Positive comment and assessment are often conspicuous by their absence in written work which is based on books. The teacher's red pencil complains that the work is untidy or illegible or compliments it for being neat and interesting. Twenty pages on butterflies may be copied word for word and picture for picture from one information book, and commended at the end. I was shown recently a piece of CSE Mode III course-work on 'World Religions' (sic.). The folder was two inches thick, and I read through every word of it without once hearing the authentic voice of the writer. It is not surprising that sixth form students find difficulty in using library reference books efficiently, and have to be taught how to take notes, how to collate and organise their material. It seems likely that more useful practice in the early stages will result in greater effectiveness and maturity later on. What is true of the use of books in producing written work in primary schools is true in more sophisticated ways in sixth forms.

To sum up: objectives in demanding written output as a result of using books should be formulated. There may be too much writing, particularly in junior classes. Reading should produce more talk and discussion—an important means of internalising ideas and experience—before or instead of writing. Writing from books should be part of a larger exercise, and should be seen to be so. Output which is unrelated to other classroom preoccupations or activities is of limited value. Writing in a variety of modes, of which the selection, collation, and organisation of information and ideas is a valid one, can be progressively developed from early stages throughout the educational process. A useful starting-point at all stages is the posing of problems to be solved rather than of factual questions to be answered. Finally, awareness of language, of how it operates, its appropriateness for the pupils who are exposed to it, and its quality in the books which are provided for them, should be every teacher's concern when selecting books and initiating writing based on them.

Many school groups now visit zoos. This article discusses the way in which the educational activities of zoos have developed in recent years.

Zoos and Education

D. G. LAMBERT

D. G. Lambert was the first Education Officer of the Zoological Society of London and now works in the North Western Division of HM Inspectorate.

In the last few years the number of zoos, in the widest sense of the term, has increased considerably. This in turn has led to added interest in them by schools, both for recreational and educational visits, and it can well be argued that these two types of visit are not incompatible as even in a recreational sense a zoo should be educational. There is no harm, and some considerable merit, in finding enjoyment in learning. Nevertheless, many of the zoos in England have concentrated more on the side of amusement and this attitude is rapidly becoming less easy to defend. It partly stems from their history. A zoo was, and unfortunately in a number of cases still is, primarily a place where the public could gaze at an exhibition of living animals that had been brought back from the less civilised parts of the world. It was an extension of the collections of trophies brought home by the early explorers for their royal patrons and this type of collection still existed as a royal zoo in the Tower of London in the early part of the nineteenth century. The housing of the animals in relation to their specific needs was secondary to their viewing by the public and veterinary care was negligible. The animals were expendable and as Professor Hediger has said in *Man and Animals in the Zoo* they put animals on show 'virtually as wares to be displayed, in which practically nothing is done about education, research and conservation'. Gradually, responsible management realised that there was more to a zoo than this; research facilities were made available, libraries developed and the health of the animals, possibly because of their value, became more important. In the last two or three decades it has become apparent that in a civilised society the only real justification for keeping a collection of animals out of their natural environment are conservation and education. These are interlinked—without education the need for conservation will not be apparent and the resources necessary will not be forthcoming. Already successes in conservation have been recorded; the survival of the Hawaian goose as a species is due to their breeding by the Wildfowl Trust at Slimbridge and specimens of Père David's deer have been returned to China, where they had become extinct, from Whipsnade Park.

Generally, the educational aspect of a zoo's work is restricted to the labelling of the exhibits. This is often poor, both in terms of information available and in visual impact, but it is vitally important. The labels form a channel of information from the zoo to the public and it is through them that the casual visitor obtains his 'education'. Nothing can be more frustrating for a visitor to a zoo than to find cages unlabelled, or labels which fail to give basic facts, or an enclosure or cage with many animals and many labels but no way of deciding which label refers to which inhabitant. It is not an easy problem to solve, but unfortunately many of the smaller zoos have not yet begun to tackle it. A

further extension of this channel of information to the public would be for a zoo to take its patrons into its confidence. Explanations about why the zoo is organised in a particular way; why lions and tigers are kept close to each other and not close to their ecological neighbours; why some animals are actually healthier in small cages than in large, and so on. These, and many others, are the type of questions that the public often ask but have no way of getting a knowledgeable reply.

The educational value of an organised school visit to a zoo can be considerable. It is not just a question of giving pupils the opportunity to see animals as part of their course in biology; many schools have also developed an integrated study which may make use of, for instance, mathematics, art, English and geography. The biological content of such a visit to a zoo can most easily be explained in terms of seeing living animals, watching them move, feed and respond to a variety of stimuli, both artificial and natural. In addition many aspects of animal behaviour, especially those related to camouflage, movement and displacement behaviour, cannot really be studied anywhere else and are often far from satisfactory when seen on film. The combination of these strictly biological objects, the wider concept of an integrated study and the stimulus provided by fresh experience, justifies the interest and importance which many schools place on their visits to zoos.

Although the Zoological Society of London had organised lectures for LCC teachers as early as 1910, the first comprehensive scheme to make the facilities of a zoo available for educational visits began at Regents Park in January 1958. With the help of a grant from the Nuffield Foundation and the support of the then LCC and surrounding local education authorities, the Zoological Society appointed an education officer, an assistant education officer and administrative staff. It was decided that the most effective way of using the resources of the zoo was to provide facilities for organised parties of school children to attend lectures and guided tours on biological topics which were related directly to the work going on in the schools. This type of education scheme is expensive as it involves the provision by the zoo, not only of the lecturer and related administrative staff, but reference material, lecture rooms and, above all, careful planning and control. Schools pay an entrance fee but this cannot be expected to cover all the costs and so a subsidy is essential. Few zoos can, or will, provide this subsidy and this is quite understandable. Nevertheless, because of the zoos' staffs' skill in animal management and their knowledge of their own zoo, this type of scheme is probably the most productive form of zoo education as it enables school children to come directly into contact with those responsible for the running of the zoo. Because of the problems of expense it will doubtless continue to be adopted only by the larger zoological societies, and by those supported by LEAs, as it requires an income by the zoo of well above average in gross terms and it is unlikely to be considered by those establishments which have shareholders to satisfy.

A further extension of this direct participation by pupils is the formation of some type of zoo club which can give special facilities to its members. If, as well, the zoo runs an information bureau available to the general public and to schools, then a very complex pattern of educational activities will emerge. Furthermore, if the teachers intending to bring school parties to the zoo are involved before and after their visit then this would seem to be the ideal situation. In the 13

years that the Zoological Society of London has been running such a scheme the number of school children attending has increased from approximately 14,000 to over 63,000 in 1970/71. These totals include primary school children and also visits to Whipsnade Park but the majority are secondary pupils attending Regents Park. Additionally, the Zoological Society has provided special lectures for college of education students, university students, students of chiropody and trainee laboratory technicians.

At much the same time, in the early 60's, the Herbert Whitley Trust at Paignton and the local education authority co-operated in the appointment of an education officer and a series of lectures and visits by both primary and secondary school children was organised. A major difference between this scheme and that at London is that the education staff are appointed and paid for by Devon County Council and Torbay County Borough Council, and not by the zoo. Also, the education service at Paignton is administered by the Herbert Whitley Trust and not by the zoo itself. This scheme, like the one in London, has flourished and over 8,000 day visits were made by organised groups from a variety of institutions in the academic year 1969/70. The great majority of these were from primary schools. In addition, in 1969/70, nine residential courses were held when over 200 students, from schools, a college of further education and a college of education, attended. There is no residential accommodation at the zoo so these courses can only be held when local hotels are able to provide facilities. This restricts this part of the Trust's activities but at the same time it would be unrealistic to try and combine a large number of day visits with residential courses unless a large staff was available. There are long term plans to extend both the teaching facilities and provide accommodation at the zoo and this could well lead to the development of a centre for the whole of the south western area of the country.

There are other zoos which provide some help for school visits and one or two have staff specially provided for this purpose but no others offer the opportunities on such a scale as London and Paignton. One small zoo in Derbyshire had a trained teacher on the staff in 1970 and had also established an information room for use by both school parties and the general public, but this service was only in its infancy.

The Severn Wildfowl Trust, which is not strictly speaking a zoo, also has a full time education officer who is a trained teacher. Considerable emphasis is laid on preliminary work and every effort is made to help schools in follow-up activities. During school visits the pupils are initially guided round the reserve and are then left under the direction of their own school staff. A nearby youth hostel is used for residential courses and laboratory facilities are available there.

Many zoos will be quite unable to allocate part of their resources to such relatively elaborate schemes as are in existence at London and Paignton. Nevertheless, if a zoo is to justify its existence it must provide a wide educational service to the public and attempt to provide a more specialised service for schools. The critical factor in the success or failure of a school visit to a zoo, and this applies to visits to many other institutions as well, is the knowledge and enthusiasm of the teachers who accompany the children. To many teachers a zoo must still be, primarily, a place of entertainment, although they might well disclaim this suggestion. If teachers provide the critical link then zoos might well concentrate on providing teachers with much more informa-

tion about their activities and the opportunities that they offer for both biological and integrated studies. This need not be an expensive process and is well illustrated by the activities of Twycross Zoo in the Midlands. This is a privately owned zoo, which has developed from a collection of primates and which was established by its present owners in 1954 in Staffordshire. In 1963 the zoo moved to its present site and as it developed the owners and their staff became increasingly concerned about the facilities they were able to offer to visiting parties of school children. Lack of resources prevented the establishing of a complex educational service and they were well advised to concentrate on establishing good relationships with teachers who intended to bring parties to the zoo. An educational society was formed with this as its main object and both day and weekend courses for teachers have been held. There is little doubt that children who visit this zoo with teachers who have attended courses gain far more from their visit than those whose teachers have no prior knowledge of the facilities that exist. In the period February to August 1970 over 90,000 school children visited Twycross Zoo in organised parties and many of them were accompanied by teachers who had attended courses organised by the zoo. Similar schemes, one run by a college of education using Bristol Zoo and another run by a zoo itself at Belle Vue in Manchester, have recently been developed. It seems reasonable to suppose that this could well be the ideal compromise for a zoo which cannot afford the more expensive facilities of the larger societies but which at the same time wishes to provide a service to teachers and schools in its area.

The least successful of the educational services offered by zoos is that which provides only written information on demand. Unfortunately, very often the information sent to schools, at their request, is irrelevant to the needs and age range of the pupils involved. The information received may also be of such a general kind that it provides little or no opportunity for introductory work before a school visit. An extension of this type of service is where schools can become associated with a zoo and receive regular literature, including some form of newsletter, but again much of the material in these handouts is irrelevant.

Educationally there are comparisons to be made between museums and zoos. The use of museums by schools has been discussed in the recently published DES Education Survey number 12—*Museums in Education*. Plans for the future use of zoos should parallel, in many ways, the suggestions put forward in the museum survey. Among these suggestions are the organisation of short courses of training for practising teachers and the development of courses in some colleges of education in the use of museums. These are the two that are most likely to be of immediate value when related to education in zoos. A major difference between the use of zoos and the use of museums is that loan schemes cannot be part of zoos' educational services. At one time some American zoos established a practice of taking animals into schools but this was never very successful, apart from its obvious entertainment value. Zoos could relatively easily establish information centres both for the use of schools and the general public, and banks of visual aid material, photographs, slides and, possibly, film loops, could be developed. At a time when many pressures are being brought to bear upon schools to initiate courses in conservation it might well be that the conservation of animals, as exemplified by the activities of zoos, could act as the starting point for such studies.

In the middle years of schooling, size, measurement, shape and form build up a child's mathematical and visual concepts. A restless drive to create, to see what happens in making something, can provide the driving force in crafts.

Crafts in the Middle Years

D. I. R. PORTER

D. I. R. Porter has been Staff Inspector for Handicrafts since 1959.

It is easy to forget how much schools have changed in the last twenty years. In some respects progress has been slow, but facilities are better, methods and attitudes are freer, and more teachers are prepared to try out new approaches. In the primary sector the move towards more individual methods of working began in infants' schools and spread into junior schools. In the secondary stage, however, experiment has tended to begin at the other end in some areas of the curriculum. In handicraft the introduction of new materials and processes and the development of new courses for the young school leaver and for those in the sixth form is producing quite extensive change. Such changes are leading teachers to question whether they should continue with existing courses for the 11 to 13 age range or whether to modify them to provide better support for later work, whatever form and direction it may take. It happens that this debate arises at a time when there is criticism of the abruptness of the change from primary to secondary school and from child-centred to subject-centred teaching. Moreover many authorities are introducing separate middle schools and the age range 8 to 13 has therefore come to the forefront in discussion. Some reappraisal of the purpose and methods of craft teaching within this age range is necessary for few teachers are completely satisfied with present practice. In the primary schools it is often felt that craft could reach higher standards; some would say that the schools lack the facilities while others would point to the absence of teachers with the requisite skills. In secondary schools some teachers seem to overlook what has been done in primary school craft and are perhaps too concerned with formal instruction in workshop techniques.

Unfortunately the reorganisation that is taking place will produce a very uneven pattern of provision within the age range 8 to 13. About a third of the local authorities have decided to introduce middle schools catering for an age range of 8 to 12, or 9 to 13. These may vary from very small schools starting with little in the way of specialist facilities, to those occupying the buildings of a former secondary school and inheriting a fair range of equipment. The child, however, is the same child whatever the situation, and it is desirable that pupils should have roughly equal opportunities of development, irrespective of local reorganisation plans. The teachers' difficulty is to reach a compromise between 'freedom-without-progression' and the stricter teacher-control which takes too little account of differing interests and rates of development. Before attempting to resolve this problem it may be helpful to analyse it from two points of view, educational and technical, although obviously the two are closely inter-woven.

The Purpose: an Educational Analysis

The general aims of teaching crafts in this age range may be expressed as follows:

1. To encourage the pupils to use crafts as an aid to learning and investigation.
2. To satisfy the child's interest in making and doing, and so to aid natural physical, mental, emotional and social development.
3. To help children to employ common materials (both natural and manufactured) and to use the tools and processes invented for working them.
4. To rationalise skills and experiences so that they can be used more expertly at work or at play.
5. To introduce drawings, books, pictures, photographs and models—together with what is learned at first hand—as sources of ideas for design and construction.

By the age of 8 or 9, boys and girls will already have acquired considerable knowledge of materials and how they are used. Their previous experience at school or at home may have included the use of natural and man-made materials of many kinds and of ways of cutting, joining or combining them. They may have worked from instruction books and leaflets, and have seen demonstration not only by their teacher, but at home and on television.

It is important that teachers should recognise, and seek to consolidate, this experience already gained. In this practical field the child is certainly not starting from scratch.

Whatever their previous experience, the urge to make and to do is strong among children at this age. At the lower end of the 8 to 13 age range they may not be able to match their aspirations with the necessary skill. They are impatient to see a task completed and then perhaps to discard it in favour of something else that has captured their interest. But gradually many children develop persistence and become more self-critical: they want things that will look right, that will work or can be used or worn, things that can be taken home in the confidence that they will be appreciated and perhaps even admired. In their desire to satisfy themselves they develop and refine their technique. They are interested in the end-product but the actual making is also satisfying and exciting and they love the movement, the noise, the shavings, the smells, the helping one another and the quiet concentration on the job in hand.

It is from studies of children at work and at play that teachers can learn how to build upon their pupils' experience and to harness their energies. Children need help in gaining control over materials and tools so that they are not inhibited by lack of skill, and can devote themselves fully to achieving their purpose. A claim can be made for more variety, more freedom, more diverse materials and more scope for individuality than we have at present in some secondary schools, but equally there may be a need for more facilities and more expertise than most primary schools can yet bring to bear. Indeed, in some of the primary schools where high standards are reached, there is a desire to go still further. Head teachers often express the need for specialist help and facilities. But it is the resources they ask for, and not formal courses of instruction.

In a sense, even at this stage, craft can be thought of as bridging the

gap between creative and aesthetic experience on the one hand and problem solving on the other. It would be a mistake to make this distinction too rigid, but recent work in primary science and primary mathematics has so much in common with some forms of craft that it cannot be ignored. The study of trees, of wood and of metals in a scientific way, or of forms and structures mathematically, must obviously be of interest to the craft teacher as it is to the child he teaches. The child becomes interested in finding practical solutions to problems, but the teachers' first task is to discern where the problem may be and how the pupil may be brought to attempt it, and to arrive at a solution.

If we examine the types of activity which primary schools already undertake many opportunities exist for craft work. For example, quite apart from the great variety of 'craft for its own sake', we have:

1. Model-making arising from history, geography or environmental studies.
2. Properties for drama and dance, or puppets and marionettes.
3. Musical instruments of a simple kind.
4. Mechanisms and their applications.
5. Structures.
6. Power and engines.
7. Transport.
8. Science projects.
9. Mathematical studies and aids.
10. Sports and games equipment.

There is scope for progression within each of these categories. For example, a 'framed' building with the timbers painted on, a castle or fort with thin walls, or a man-of-war that would not float are all imperfect models, historically speaking. To improve them requires more technical knowledge and skill, providing a motive for improved workmanship. Another important aspect of the work at this stage should be the constant reference to source material; a planning/reference centre should therefore be set up in every workshop or practical area with a good supply of books and other suitable information and stimulus material.

The Purpose: a Technical Analysis

Both the administrator, who has to provide the facilities and equipment, and the teacher, who has to make and to carry out his own plans, need to have clear ideas about the range of work that may be expected. Even in the very free atmosphere of the infant or primary school, there is a plan in the mind of the teacher although it may not be evident to the onlooker. The teacher knows what ground is to be covered, by what means and in what order, although this will be less important in some aspects of learning than in others.

It is important that in craftwork also some such structure should be kept in mind. The difficulty is to express it without producing what may appear to be a formal scheme of techniques and processes. Perhaps the best way is to make a technical analysis, looking for the common ground between the different crafts and stressing the similarities rather than the special techniques that separate them at present. The ground to be covered might well be grouped under the following headings.

Drawing and designing

—informal drawing of outline views, simple plan and elevation, developing shapes from the flat, e.g. for model buildings

—measuring, reading, drawings and abstracting working details, scaling up and down

—making rough models in card, paper, clay and other materials to try out ideas

—gaining experience of materials and their qualities under different working conditions

Rectilinear work

—using prepared wood, card, metal, plastic, etc. ('prepared' in this sense meaning that the material is finished to the correct thickness, and sometimes to width)

—selecting and preparing reference lines and planes, and marking and finishing ends and sides

—locating, marking and cutting holes and other features

—bending materials in hot, cold or wet states, to produce curves and right angles

—joining materials by simple techniques, including adhesives and solders, nails, screws, nuts and bolts, and threading holes and rods

Round and cylindrical work

—working from the centre or axis

—shaping round and tapers with simple hand tools (including some of the modernised coppice craft tools, which are safe, simple and effective)

—use of rod and tube of various types, and methods of bending and joining them; forming tubes from flat sheet

—use of a lathe, if available, keeping to small diameters

Free shapes

—use of knives and abrasive tools for carving in soft materials

—using bench tools with carver's vice or holdfast for larger work

—carving soft brick, plaster, chalk

—cutting outline shapes from the solid

—using hedgerow or seashore scraps, stones, shells, etc. in isolation or in association with other materials

Attitudes to be fostered

—a growing awareness of shape and function

—a ready imagination based on practical experience

—a desire to investigate, to find out why failures occur and how to overcome them

—perhaps above all, an honest critical appraisal of finished products

A Synthesis for the Middle Years

If we consider the Middle School, there are several factors to take into account:

1. There may be only one major working space perhaps associated with other practical subjects, such as home economics, art/craft and science. In such situations sharing is unavoidable and a team-teaching situation of some kind must operate.
2. Such a space might be used in a specialist way with several small groups, or in a non-specialist way for larger groups of pupils.
3. There would also be some smaller spaces for practical work, closely associated with one or more classrooms and under the supervision of class teachers.
4. The choice of equipment for each situation, and its availability to members of staff (specialist and non-specialist) needs careful consideration.

5. The benches and machinery thought of at present as almost standard in the secondary schools may not be appropriate in Middle Schools where 13/14 is the *top* age to be considered.

In many middle schools it is expected that there would be at least one teacher devoting most of the time to craft. Some LEAs anticipate the sharing of specialists between schools, but it would almost certainly be preferable to have a person who combined some general teaching with his craft role in the same school.

In the typical middle school the specialist teacher will have a variety of situations to cope with. Three may be mentioned as of special importance: the *advisory*, *mixed-craft* and *specialist* roles.

For some of the time the specialist may be available to advise and support one or more classes and the class teachers concerned. He might, for example, be available to a complete year group, going into the classroom practical space to show how something they want to construct can be made, or alternatively he might draw away a small group to tackle some job they could not do in the classroom. In this advisory mode of working the specialist is supplementing the work of the form teacher.

There will be other occasions when, depending on the size and design of the accommodation, a group of children may be working under two teachers at different crafts in the combined working space. Some might be working upon a model too large for the classroom, others making and dressing puppets, while the majority might be simply enjoying some form of practical work over a period of weeks. Here again co-operation with the colleague sharing the workspace, and with class teachers would be essential, but at all times this is a mixed-craft mode of operation.

There will also be occasions for more direct help from the one teacher. Perhaps a group may be ready for a new range of skills, or they may need to know a particular process in order to carry out their chosen task. It may therefore be a question of sub-dividing pupils according to need, sometimes taking half-a-dozen from a class period, sometimes taking 20 while the other member of staff takes the rest for the other mixed crafts. The craft teacher in his specialist role would ensure that pupils have reached a reasonable level of competence before they leave him. This is important for those who will continue with craft in the upper stages, but perhaps even more so for those who because they will then be starting late with Latin or chemistry, for example, will need to be able to work quickly and independently in the workshops.

To clarify the three modes of working, we may take one of the activities listed above. Aspects of transport provide ever-popular themes and a group or a class teacher might need help in preparing to make, for example, a diorama. In his *advisory* role the craft teacher might show them how wire netting, papiermaché, plaster, bandage, paint and so on can be used. During a mixed craft period a group of pupils from the same class might wish to construct some traffic lights or a lighthouse. But if they wanted to make a working model it would be necessary to show them how to make simple bearings, to screw or rivet things together and perhaps to do some soldering or brazing. All this would depend upon specialist instruction being available to a smaller group.

In the majority of LEAs, secondary schools will continue to provide

education from the age of eleven or twelve, and we need to consider whether the above principles can be applied in such schools.

Experiments are being carried out in some areas where a 'foundation course' in the several boys' and girls' crafts is given. Such a course may last a couple of years, during which pupils may have spent quite a few hours per week for six to twelve weeks at five or six crafts. The problem here is to avoid repetition of what are essentially similar processes. It remains to be seen whether the so-called 'foundation course' offers a significant improvement upon previous practice or whether it would delay the creative stage.

Another possibility would be to have one workshop or craftroom in secondary schools designed and equipped as a 'transition workshop'. This would not be the old wood-plus-metal room, which was hardly ever a success, but a room equipped in such a way that 11-year-olds could be given greater freedom of action to consolidate and extend their experience before proceeding to more specialised crafts. There is nothing to prevent such a course being tried out in large schools. Taking parts of three and four above as a brief, the experiment could be started without delay, for the time is ripe and the situation fluid enough. In the middle years of schooling the child is at a halfway stage. He comes from early childhood with random experience of many kinds which is supplemented and ordered as he approaches adolescence. Size, measurement, shape and form build up his mathematical and visual concepts; materials and techniques have a scientific basis but interest, emotion and a restless drive to build, to dig shapes from the solid or just to see what happens still provide the driving force.

By the age of 13 or so, more specific interests and abilities begin to emerge, and the world of work and of leisure begin to exert other influences. At this point a re-structuring takes place, and the pupil tends increasingly to adopt and accept adult standards and ways of classifying knowledge and skill. In the workshop he or she may pursue a craft for its own sake, for its vocational or technological relevance, or just for the fun of it; there is something satisfying for everyone. But whatever the motivation, experience during these middle years will be critical. It can develop the transferable skills so essential to progress, and for many pupils crafts will provide not only enjoyment but also a means of self-education.

The secondary schools of England and Wales have laboured for a long time under a shortage of well qualified mathematics and science teachers. There are at last some signs that the situation is changing.

Maths and Science Teachers

DONAL O'DONOVAN

Graduate Teachers

Though non-graduate teachers of mathematics and science make an important contribution in secondary schools, and though the foundations of mathematical thinking are laid in the primary schools, the most serious shortage, and the one most liable to have adverse effects upon the future supply of highly qualified mathematicians and scientists, is that of graduate teachers. Recent totals of graduates in mathematics and science *serving in maintained schools*, by first-named subject of degree, are shown in the table below; all but about 3 per cent of the mathematics graduates and 6 per cent of the science graduates are in secondary schools.

Donal O'Donovan was, until his recent retirement, an Assistant Secretary in the DES concerned with questions of teacher supply.

Graduate teachers by first-named subject of degree

31 March:	1967	1968	1969	1970	Percentage increase 1967-1970
Mathematics	5,722	5,710	5,703	5,806	1·5
Biology	3,042	3,179	3,284	3,423	12·5
Chemistry	3,532	3,645	3,789	3,934	11·4
Physics	2,928	2,976	3,035	3,091	5·6
All subjects	61,462	62,485	63,973	66,494	8·4

The table gives the most convenient indication of progress in the struggle to build up the number of mathematics and science graduates, but it does not give a complete picture of the graduate force available for each of these subjects, for many graduates who included the subjects concerned as their second- or third-named subjects of degree are competent to teach it to a high level. The following table gives the relevant figures for 1970.

Graduate teachers by subjects of degree

31 March 1971	As 1st-named subject of degree	As 2nd-named subject	As 3rd-named subject	Total
Mathematics	5,806	1,515	523	7,844
Biology	3,423	698	189	4,310
Chemistry	3,934	1,187	387	5,508
Physics	3,091	2,518	243	5,852

NOTE. There are overlaps between the different lines of the table. A maths-and-physics graduate, for example, would appear in both the first and the last line.

Not all teachers who have included mathematics or a science subject as part of their degree have done sufficient work on it to qualify them for sixth form teaching, but on the other hand some teachers whose

formal qualifications are not in this category are competent teachers at this level. The totals in the fourth column may perhaps be taken as a rough indication of the total number of full-time teachers available for advanced teaching in the subjects concerned. (Figures for part-time teachers are not available.)

Level of Degree

The percentage of graduate teachers with 'good honours' degrees—that is graduates with first or second class honours—has been lower in mathematics and science than other subjects but has been increasing. It is highest in the lowest age groups.

Graduates teaching with good honours degrees (percentages)

	31 March		
	1962	1966	1970 (Provisional)
Graduates with mathematics as first-named degree subject	37·1	39·1	40·3
Graduates with science as first-named degree subject	46·6	46·4	48·0
Other graduates	58·0	60·1	61·7

By age and first-stated subject of degree, 31 March 1970

Age group (Men and Women)	Maths	Science	Others
Under 25	46·1	56·3	71·2
25–29	45·1	50·1	66·4
30–34	35·1	46·3	62·0
35–39	40·8	42·8	57·7
40–44	33·7	38·7	56·0
45–49	35·0	38·0	60·5
50–54	40·7	51·9	58·9
55–59	40·0	50·5	56·5
60 and over	40·8	51·3	52·7

The intermediate age range shows the lowest proportion of good honours. The higher proportion of good honours among the youngest teachers is a good omen. Each age cohort of teachers does not, however, necessarily remain the same in this respect as it gets older: transfers to other parts of the educational system, in particular, are likely to be most frequent among the graduates with the better degrees.

Age Distribution

The following table gives the percentage of men graduate teachers in the various age groups in 1970. (The corresponding figures for women would be complicated by leaving the service on marriage or child-bearing.)

Age distribution of men graduate teachers (percentage, 31 March 1970, provisional)

Age	Maths	Science	Others
Under 25	11·4	9·8	8·5
25–29	19·2	22·0	17·2
30–34	16·5	20·4	17·6
35–39	10·5	12·0	13·4
40–44	10·3	9·4	11·5
45–49	5·9	5·7	8·7
50–54	7·6	5·8	8·6
55–59	11·7	9·7	9·9
60–64	6·4	4·8	4·4
65 and over	0·5	0·4	0·2
Total	100·0	100·0	100·0

Some of the intermediate age groups are notably weaker than the youngest and oldest. The value of the contribution made by the older mathematicians is particularly evident. One of the reasons why the number of mathematics graduates has been slow to rise is in fact that the stock included large numbers of the older teachers so that retirements on age grounds were numerous. But the largest year-group among older mathematics graduates has been the group born in the year 1908-1909; the groups born in subsequent years tend to become progressively smaller. The wastage through retirement is by now probably becoming less important. The annual intake of younger mathematicians now greatly outweighs this loss.

The Extent of the Shortage

Shortages are not easy to define or measure, for gaps tend to be filled with varying degrees of permanency by teachers whose qualifications fall short to differing extents of the ideal. The Department made sample surveys in the summer terms of 1969 and 1971 of the needs of the schools as seen by headmasters and headmistresses. The surveys were aimed at producing broad conclusions rather than precise figures. They indicated that shortages were unevenly distributed over the country, that they were—as was already known—severe in mathematics and physics, but that there was a significant improvement over the two-year period in the supply of science graduates generally and that there was possibly a slight improvement in the supply of mathematics graduates. In 1971 there was still a demand for about 1,600 graduates who would teach mathematics as their main subject and for about 500 graduates who would teach physics as their main subject. All figures are subject to sampling errors, and the results do not imply that if so many mathematics and physics graduates could miraculously be produced at once they could be immediately absorbed, for many of the heads who recorded a need for a graduate teacher have at present a non-graduate teacher of the same subject filling the gap. But since improvement must at best be spread over a period of years there should be a gradual re-shuffling of staff which will make absorption possible.

New teachers will be needed not only to eliminate these shortages and to replace natural wastage but also to cater for an increased number of secondary pupils. The secondary school population is now increasing by about 4 per cent a year; there will be a specially large increase in 1973/74 because of the raising of the school leaving age; after about 1975 the rate of increase is expected to drop below 3 per cent per annum. Much of the teaching of the pupils who will remain in the schools because of the raising of the school leaving age will probably be undertaken by non-graduate teachers, but the regular annual increase which occurs because more pupils are staying on voluntarily for a longer time will create a demand for more graduate teachers which is at least proportionate to the increase and may be rather more than proportionate, because the voluntary stayers on are taught in smaller groups than the average. It is too early to make precise estimates of how many additional graduate teachers will be needed but clearly the stock will need to be increased, over the next few years, by at least 4 per cent per annum—say 250 mathematicians and 120 physicists—merely to maintain existing standards, quite apart from remedying the shortages.

Future Prospects

The future propects are perhaps beginning to look brighter. The numbers entering, or applying for, training in any year give valuable indications of the prospects for recruitment for a year or two ahead. A proportion of the graduates who take the training course do not enter the maintained schools, but on the other hand some graduates enter the schools who have not been trained, or who were trained in earlier years. The following tables show how the output of trained graduates is improving: the first traces developments from 1963 onwards; the second gives more detailed figures based on subject of training and not subject of degree, which have been available since 1968 or 1969.

Maths and science graduates admitted to courses in education

1965	1966	1967	1968	1969	1970	1971	1972
1,302	1,362	1,528	1,882	2,082	2,231	3,101	3,700 (estimated)

Graduates taking maths or science as a main subject of their post-graduate course.

	1968	1969	1970	1971	1972*
Mathematics	531	646	703	934	1,280
Science	1,340	1,502	1,662	2,169	2,450
Physics (included in Science)	n.a.	413	425	493	675

*The last column is an estimate based on the flow of applications for places on the courses beginning in October 1972.

There are also some indications that the number of mature mathematics and science graduates in industry and commerce considering moving into teaching is increasing.

Thus it seems clear that the next two school years should see a substantial improvement in the supply of mathematics and science graduates in the schools. Though there are too many unknowns to allow any accurate forecasting, a rough impression of the extent to which the mathematics shortage may be made good can be formed by observing that the 531 trainees of 1968-69 who became available to enter the schools in autumn 1969 presumably contributed substantially to the beginnings of improvement that were apparent in March 1970 (see table above). It would not be absurd to hope that since about 900 trainees should successfully complete their courses this summer the stock of mathematics graduates may rise by 300 or 400 next autumn. There should be a further, and larger, increase in autumn 1973.

It remains to be seen whether an improvement of this order will continue thereafter. An improvement in the employment situation would no doubt increase the number of alternative openings for graduates, and might slow down, or conceivably reverse, the upward trend of recruitment.

Non-graduates and B.Ed's

The state of supply of non-graduate teachers of mathematics and science is harder to assess. The shortage surveys of 1969 and 1971 indicated a demand on the part of heads for about 800 non-graduate teachers of mathematics and only very small numbers of non-graduate teachers of science. It was also clear from the surveys that many of the

non-graduate teachers of mathematics would become surplus to need if sufficient graduates were forthcoming. Such teachers could not in practice be moved from one school to another. They would no doubt be used in the first place to teach alternative subjects, but over a period many of them should be re-absorbed into teaching mathematics as vacancies at their level occurred in their schools, and some would move to other schools. It seems reasonable on balance to assume that though there are still many schools that badly need non-graduate teachers of mathematics and cannot get them this shortage would tend to disappear, even without an increased flow of non-graduate teachers of mathematics, if the flow of graduate teachers of mathematics improved sufficiently.

The flow into training of non-graduate students who have mathematics or science as main subjects is shown by the following table.

Numbers of students on main courses by subject

	1967	1968	1969	1970
Mathematics	2,136	2,294	2,123	2,117
Biological Science	2,300	2,493	2,380	2,354
Combination of Physical and Biological Sciences	198	189	150	209
General Science	206	199	154	122
Physical Science	1,218	1,221	1,045	949

The figures in this table relate to courses not persons, and many students are therefore included twice. The students covered by the figures may decide to teach in primary, middle or secondary schools: roughly a third of the students covered by this table are taking courses of primary teaching and are likely to go to primary schools, a third are taking secondary courses, and a third courses which cover both types of teaching.

The conclusions that can be drawn are that numbers are being roughly maintained except in physics, where they are falling; and that probably about 1,000 mathematics teachers and 500 physics teachers (with some overlap) from this source are available to the secondary schools each year. Some of them will have B.Ed degrees.

Quality of Non-graduate Teachers

The Royal Society's report on the shortage of mathematics and science teachers in schools drew attention to a decline in the number of A levels in science and maths held by non-graduate entrants to initial training courses. The following table recapitulates some figures for 1966 to 1968 quoted in the report, and adds some more recent information.

A level passes of students accepted for 3 and 4 year courses

	1966	1967	1968	1969	1970	1971
Mathematics	1,708	1,709	1,625	1,496	1,462	1,691
Biology (including botany and zoology)	2,291	2,074	2,297	2,088	2,185	2,163
Chemistry	878	788	691	567	550	631
Physics	856	748	681	575	562	614

It seems that the decline has been halted, for the moment at any rate, and that in mathematics there is an encouraging upward turn; but in

physics and chemistry the numbers are still well below the level of a few years ago. The original decline no doubt reflected the tendency for more and more sixth-formers with A levels in science and mathematics to enter degree courses.

Long Term Supply

To complete the picture it may be worth glancing at the sources from which graduate teachers of mathematics and science must come in the future. The following table gives some indication of the size of the pool from which, six years ahead, the graduate teachers of science and mathematics will be drawn.

Pupils following GCE 'A' level first-year courses (maintained schools at January in each year)*

	Mathematics/ science subjects only		Other subjects only		Subjects in both the mathematics/ science group and other groups	
	number	%	number	%	number	%
1962	23,671	42·2	26,446	47·1	6,015	10·7
1963	26,460	40·1	31,858	49·3	7,589	11·5
1964	30,200	37·7	39,656	49·6	10,163	12·7
1965	28,824	35·7	40,404	50·0	11,529	14·3
1966	28,295	34·1	42,339	51·0	12,339	14·9
1967	27,554	31·5	45,200	51·7	14,728	16·8
1968	27,994	30·0	48,485	52·0	16,706	17·9
1969	29,159	29·8	49,750	50·9	18,815	19·3
1970	31,093	29·8	52,850	50·6	20,488	19·6
1971	31,550	29·6	53,484	50·0	21,611	20·3

*For some minor qualifications to the table, see explanatory notes 32 and 33 of *Statistics of Education*, 1970 Vol 1.

The table has been taken back sufficiently far to cover the years when the 'swing from science' was the subject of widespread discussion. It will be seen that

a. the *numbers* of students in the mathematics/science group are rising and are above their former peak level of 1964;

b. the *proportion* of students in this category has fallen heavily and the fall has not even yet quite halted. On the other hand,

c. the students taking subjects in both categories have increased considerably both in numbers and in percentage.

The consequence of this latter development is that the proportion taking 'other subjects only' category has changed relatively little, rising from 47 per cent in 1962 to 52 per cent in 1968 and falling to just over 50 per cent in 1971. This means of course that the proportion taking at least one science subject swung from 53 per cent in 1962 to 48 per cent in 1968 and then back to 50 per cent.

Although traditionally the pupils who took mathematics/science subjects only were the source from which university students of those subjects were recruited, there has recently developed a marked tendency —probably encouraged by the Dainton Report—for sixth-formers to try to bridge the gap between the 'two cultures'. Science specialists have been more ready to take an arts or social science course in addition, and vice versa. Detailed study would be needed to estimate how many of

the mixed group are potential mathematics/science graduates, but statistics of the combinations of A level subjects taken (*Statistics of Education* 1970 Volume 1, table 13) suggest that the number must be substantial. Detailed information from one GCE board suggests that the majority of this group may take two science A levels. One can infer that the proportion of first year sixth-formers who can legitimately be called science specialists, though no doubt smaller than it was 8 or 10 years ago, has fallen much less than the figures of the table might suggest. It is also clear that the numbers in this category are now a good deal bigger than they were in the early 1960's even though the age groups from which current sixth-formers are drawn are a good deal smaller than those born a few years earlier or a few years later. Moreover, many of those who have only one A level in the mathematics and science sector, and would probably not qualify for a mathematics or science degree course, would nevertheless be qualified to take mathematics or science as a main course in a college of education, and could make a useful contribution to the needs of the schools in these subjects. All in all, there is ground for cautious optimism about the size of the pool from which teachers of mathematics and science will be drawn in the second half of this decade.

Concern for the educational preparation of a technologically sophisticated work-force is not only of interest to us in Britain.

Education 15–20 in Advanced Countries

EDMUND J. KING

Edmund J. King is Director of the Comparative Education Research Unit at Kings College, London.

It is significant that in the technologically advanced countries where industries are increasingly sophisticated there is so much talk about young people aged 15–20. All this talk is about young men and women staying on voluntarily in full-time education beyond the age of compulsion. No matter what is done about raising the age of compulsion, we always have more and more volunteers. Some writers talk about the 'sixth form explosion'—already a conservative phrase. In other places the terminology is 'junior college group' or 'upper secondary school'. One thing is certain: that we are all uncertain about how to describe, measure, assess, and cater for this very important group of people.

Different countries have hitherto relied on very different educational legacies from the past—legacies of institutions, concepts, practices and intentions. These interlocking aspects of any educational system are obviously inseparable from the social, economic, and political order likewise bequeathed to us. Since the middle of the nineteenth century, the increasing intervention of all states in the provision and supervision of school and college facilities has slowly altered spontaneous developments into a deliberate apparatus of statecraft and socio-economic development.

The influence of UNESCO and OECD has been powerful in persuading nations that all aspects of educational development should be envisaged together. No single type of school, no slice of the age-range, no social stratum could be overlooked or neglected in the total housekeeping of education. Indeed the OECD influence went further: it made it clear that questions of *economic* development turned largely on questions of educational development. Many important researches in recent years have further shown that both aspects are inseparable from questions of total amelioration. In fact, educational reform and educational research are increasingly directed towards problems and decisions which are essentially social, political, and economic.

Thus the phenomenal expansion of the population in the upper-secondary school is not simply a school statistic. It is not something to be analysed pedagogically or organisationally as Crowther did as recently as 1959. Our growing numbers of full time 'students', now on the threshold of fully adult status at the age of 18 and increasingly on the threshold of some post-secondary education, are in a world whose dynamics of decision have been transformed, and whose perspectives for the future are shifting so rapidly that it is hard for older people to realise how sudden the changes have been. When Professor H. C. Dent wrote *A New Order in English Education* in 1942 only 8 per cent went to a secondary school at all (and most of those left at the age of 16 or

before), while only 1 per cent went to university. The proportion of working class children so succeeding was infinitesimal.

Though well over half now stay on over the age of 15 in this country even in 1970 only a quarter stayed on over the age of 16 in secondary schools. A few more were in further education. In 1968 Dr J. W. B. Douglas, Miss Jean Ross, and Mr H. R. Simpson found (in *All our Future*) that some 30,000 boys and girls aged 15 left school for manual jobs though they were intellectually capable of going on to university. Furthermore, these writers declared that the fate of children in Britain was largely decided by the time they were 8 or even earlier.

The same sad picture is painted in the Plowden Report, by Sir Alec Clegg's surveys, and by systematic research into the circumstances and motivation of the 'disadvantaged child' here and in the United States. American and British research alike has shown that a child's linguistic and social competence may be impaired from his first birthday onwards, with profound results for his later education. It is astonishing that so many boys and girls carry on in full-time education. Figures published just over three years ago showed 19 per cent of those aged 17–18 in full-time education in the United Kingdom. By international comparisons that was a small proportion. France and Italy had 24 or 25 per cent in full-time education at that age by the middle 1960s; Japan then had 72 per cent, and now has more than 85 per cent. Sweden has about 80 per cent in full-time education at this level, and the United States still more.

The size of these enrolments is, even so, less impressive than the speed of increase. Nearly all the countries which have raised the age of compulsory attendance to 16 had more than half their school population staying on already. In upper secondary education as a whole within the member countries of OECD the proportion of the age-group enrolled more than doubled between 1955 and 1965. Since that time rapid increase has continued.

Physical persistence in schools has been accompanied by improving attainments. A 1969 publication by Professor Moser's group on the basis of statistics available when writing showed almost 15 per cent in Britain going on to some post-secondary education. However *Statistics of Education, 1970* revealed that in 1969 22.2 per cent of the 18–19 age-group actually received local authority awards for university, college of education, or further education. In 1970 that proportion increased to 23.1 per cent. An increasing proportion of the sixth form age-level evidently are not only able but eager to continue education after 18.

In 1970 Professor Niblett's Higher Education Research Group forecast that by 1980 25 per cent of our British population would get 2 'A' levels—roughly a doubling in a decade. Sweden already has some 24 per cent entering higher education at a noteworthy level of attainment. Japan has a somewhat similar figure, with a perhaps less elevated attainment overall. Many cities of the United States show between 45 and 50 per cent enrolling for post-secondary ('higher') education.

For a variety of reasons many countries have undertaken radical reforms during the past decade or so: France in 1958/9 and 1968; the USSR in 1958 and 1964; the Netherlands in 1960; Italy in 1963; and so forth. Many or most of these reforms altered the structure of secondary education so as to provide a continuum of common school

experience—a 'comprehensive middle school'—to the age of 14 or 15. This is followed by a more nearly common upper-secondary school structure moving from a deeply differentiated system towards a more convergent or 'equivalent' upper-secondary school. The Swedish experiment is well known. From 1945 onwards the comprehensive pattern of schooling to the age of 16 gradually spread over the whole of Sweden, until in 1971 the 'comprehensive upper-secondary' school was everywhere extended in principle until the age of 18 or 19. In more differentiated upper-secondary school systems (like that of the USSR) the proportion of pupils attending the ordinary 'general and polytechnical' upper-secondary school (rather than specialised or vocational schools) has likewise increased markedly.

It will be noted that these reforms are structural. More recently attention has been drawn away from organisational differentiation towards teaching-learning variety within a comprehensive system, and especially towards new curricular needs and a different map of learning. Merely to accommodate the bodies, many school systems have felt it imperative to use separate premises for the over 15s or over 16s. Furthermore, the supply of special apparatus the concentration of facilities, and the channelling of specialist teachers for most effective use, have all tended to make 'special places' of some 'sixth form units', 'junior colleges' and their counterparts abroad. Broadly based recruitment for such 'young adult' institutions has encouraged new combinations of subject-interest, a wider range of personal and social experiences, and less predestination for particular careers afterwards. These circumstances combine with external pressures to alter the quality of learning and commitment even when the names of studies appear to be the same. In keeping with general educational trends, these young adults concentrate on learning to learn, learning to use learning, learning to judge, and indeed learning to make new knowledge.

Unevenness of Opportunity and Expectation

In a moment we shall see that the logic of a changing occupational pattern and the need for life-long re-learning would justify this postponement of career choice on general grounds. Unfortunately there are also compassionate grounds for keeping doors open as long as possible. The *Statistics of Education* published annually, and occasional reports such as census returns, show clearly that Southern England obtains twice as many certificate passes as Northern England. In one recent survey 11 per cent of leavers in Kent, Surrey and Sussex had two or more 'A'-level passes and 25.3 per cent had at least 5 'O'-level passes—figures which must be compared with 5.9 per cent and 14.1 per cent respectively in the Northern region consisting of Cumberland, Durham, Northumberland, Westmorland, and the North Riding. UCCA reports show conclusively that middle-class children have appreciably better chances of getting to universities—and especially to the university of their first choice—than children with poor backgrounds. In the annual analyses of schools obtaining open awards to Oxford and Cambridge, schools with large sixth forms are overwhelmingly more successful than schools with smaller numbers at the top. Only 10 per cent of the schools appearing to head the league-table of admissions to the older universities are maintained schools.

The uneven distribution of well-qualified teachers in mathematics, sciences, and a few other subjects (especially for girls) means that

in the overall process of expansion some schools come off very badly indeed. Not long ago it was revealed that only about half of the people teaching science and mathematics in London were properly qualified to do so. A more dismal picture could be painted elsewhere. Over-size classes and variations in book supply or equipment are just two factors in the general inhibitory effect of regional, social, and scholastic disadvantage. It is no wonder that for accidental reasons of this kind young people often 'make do' with the kind of education they are receiving or with subject choices as simply the best available, without real commitment to them.

In any case, our 'threshold' population of newcomers aged nearly 18 requires us to take a new look on several grounds:

a. The population is very far from homogeneous, but represents boys and girls from varied backgrounds showing remarkable differences regionally, socially, and in terms of previous scholastic opportunity.
b. The *external* criteria by which educational needs and priorities must be measured include first a total appraisal of national wellbeing, and secondly the rapid development of educational and socio-economic housekeeping in our neighbour countries and competitors.
c. Older sociological research often dealt with substantially *self*-regulating groups and sub-groups in society, whereas the educational process is in a different category because a large part of it (and practically all the formal part) is now part of *State*-regulated business. Even the apparently spontaneous part is *taught* by older people to younger people with the intention that these should be acculturated or trained in an approved system.
d. The salient but overlooked influence calling for new research is that all these young people are *in formal education*—a novel phenomenon—while such education for the young adult is itself undergoing unprecedented changes in content, relationships, and orientation. (Practically none of the research on adolescents-in-general which is so frequently quoted takes real account of the fact that an increasing proportion are 'in school', or that their learning is for different worlds from ours—perhaps already *in* a different world).

Changes in Occupational Structure and Expectation

Changes in the occupational structure form an important part of the awareness of all young people. Sociologists and economists often set out job distribution in tabular form like the 1966 percentages quoted below:

	Agriculture	*Industries*	*'Services'*
India	85	10	5
USSR	27	43	30
Western Europe	14	44	41 (47% in the UK, France, Netherlands)
USA	5	35	60

A table like this looks static. In fact it is constantly changing, with a shift in the first instance from agriculture to industry, until that generally reaches a figure of about 50 per cent of the paid work force: thereafter industrial employment declines until the 'services' reach or outstrip the figure for industry. Of course such categories are merely convenient dockets. The figures for 'industry' include clerks, and

'services' include dustmen; but the figures generally indicate growing sophistication, increasing amounts of education and training, and greater mobility of every kind as we move diagonally over to the right and down the column. Furthermore, more skill and education go into job-preparation—even in agriculture and industry—as technological advance increases productivity per man-hour.

Young people's job hierarchies are different from those of their elders, especially of teachers. *Qualified Manpower in Great Britain* (HMSO 1971) showed that 92 per cent of active employees qualified to teach were actually teaching, whereas fewer than half of the labour force qualified in accountancy were working in that capacity. Relatively speaking, teachers stay put if they are in paid employment at all, though people in other occupations move more freely. People in the middle technical and managerial occupations (which in all sophisticated countries provide about five middle-range persons to support the skills of every top technologist or entrepreneur) are much more mobile, as their occupations are hungry for talent and training; however, in Britain only 10–20 per cent of workers in this range are regarded as properly qualified.

Response to Change: New Programmes, New Research Needs

Junior colleges in the United States and here, the *Instituts Universitaires de Technologie* in France, the new technical colleges in Japan, and similar post-secondary institutions have been widely set up to cater for this need. At or straddling the upper-secondary level many European countries have pre-vocational or 'polytechnical' teaching and perhaps training of an evidently purposeful kind. This appeals to many young people, their parents, employers, and even trade unions. The appearance of utility, with manifest links with the world picture as young people know it, makes many prefer this kind of interim presentation rather than the venerable vistas of ritualised procession through the universities. Moreover many young people in several countries during the past two years have shown unmistakably that they prefer practical (but polyvalent) training to the later prospect of (untrained) graduate unemployment.

Student suspicion of indelible rubber-stamping for careers is well supported. The diploma of the atomic centre at Saclay in France lapses after 5 years if not updated or renewed. Some American states cancel a teaching qualification after 5 years if no further credits are obtained for in-service review. Some of the newer proposals for higher education in Britain (even before James) have long suggested a basis of 2-year diploma or pass-degree courses, to be followed by other degrees or higher qualifications later. The James Committee envisaged such programmes for the colleges of education; but something of the same sort was implicit in Robbins. In any case the new CNAA degrees and many sandwich courses are firmly based upon links with life and the assumption of continuous on-the-job learning.

Lord Eustace Percy long ago recommended a period of industrial experience before going up to the university, and the USSR has insisted on this for nearly all students since 1958. Voluntary service overseas (VSO) has provided a comparable experience for a small but enterprising minority of our young people. We must not forget the continued existence of military conscription in many countries. In

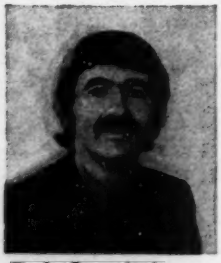
some cases (like the Iranian Education Corps) it is sometimes educationally constructive. The question is constantly asked whether school or college by itself—no matter how re-constituted—is really the answer for all the young men and women, especially when the proportion of those intended for full-time education or training rises quickly from 10 per cent to 25 per cent, and perhaps to 40 per cent or 50 per cent. No one really has the answer to this problem.

Concerted research into the educational and social consequences of rapidly increasing (and increasingly voluntary) school or college enrolments between the ages of about 15 and 20 is a matter of national and international importance. With so many countries hanging on to the tangled inheritance of past institutions, practices, and unspoken preferences, yet with so many new situations looming up before the young people now aged 15 to 20, it seems best for research to concentrate whenever possible on the extensive frontiers of decision on which the young people find themselves. Their very varieties of perception and commitment provide so many proving-grounds for whatever we try to offer them. Moreover, those same young people often make common cause within their own country and internationally in recommending important social and educational changes. Sometimes at least they see quite simply some trends and implications for policy which we older hands fail to see.

Structural changes may be made in a national system of education, but changes in the purpose and method of approach in teaching may not proceed at the same rate. This article is a personal assessment by the author of the situation which appears to have developed in France.

Teaching in French Schools

D. A. GROARKE



D. A. Groarke is Senior Lecturer in French Studies at Mather College of Education.

Addressing the Departmental Inspectorate on 19 February 1968, M. Peyrefitte, the then French Minister of Education, stated: 'So far the reforms have transformed the body of the educational system, now the task is to transform the soul.' Since the period after the First World War many leading educational figures in France had been aware that the teaching profession suffered from deep internal rifts, and that any reform of the school structure, particularly at post-primary level, would meet with only limited success unless there was a fundamental overhaul of teachers' attitudes and methods. It is the aim of this article to examine some of the epistemological and pedagogical assumptions of French teachers and to show how, despite the reforms of the 1960's, traditional ends still persist, often implicitly, on to which new aims and methods are grafted which are in direct contradiction to them. The problem is further aggravated by a confusion within the profession about its role in, and its relationship to, society at large.

The reforms to which M. Peyrefitte referred were based partially on the Langevin-Wallon proposals of 1947. The structure of post-primary education in France, prior to the 1960's, bore considerable similarities with other West European systems, in that it was dominated by notions of academic and social elitism. Traditional secondary education, largely the preserve of the bourgeoisie, was dispensed in lycées and collèges which were staffed by graduate teachers, professeurs. Pupils were frequently drawn from associated primary schools and had to pass an entrance examination at the age of 11. The schools carried great prestige and provided a highly academic course with a large content of classical languages, culminating at the age of 18 in the *baccalauréat* which was an entrance qualification to university. The academic secondary sector catered for only a small minority of children, and the remainder were educated in elementary schools which did not provide full-time courses for children beyond the age of 16. A child in the elementary sector after the age of 11 stood virtually no chance of university education. Elementary school teachers, *instituteurs*, were recruited from the most able children at these schools, usually at the age of 16, and trained at *Ecoles Normales*. In theory all the schools were egalitarian, in that they were free and open to all, but in fact the system reinforced and perpetuated privilege by the practice of selecting elites from a limited social stratum; both sectors, elementary and secondary, remained isolated and self-contained.

During the period after the Liberation this structure came under widespread attack. Industry was dissatisfied by the rigid, classics-

dominated courses in the *lycées* and sought curricula more relevant to the country's economic needs. With rapidly expanding secondary and tertiary sectors of employment the demand for both skilled workers and a high general level of education amongst the whole population became essential. To offer the great majority of children only limited educational opportunities was seen as economically wasteful and socially unjust.

The restructuring of secondary education was undertaken in the 1960's. The outcome was a system of comprehensive middle schools, called *colleges d'enseignement secondaire* (CES), accommodating all pupils from 11 to 15. After 15 pupils proceed to differentiated schools according to their abilities and desires. The lynch-pin of this scheme, the CES, although nominally a unified school, contained rigidly separate 'streams', however, corresponding to the former *lycée* and elementary courses, and staffed by their former teachers who remained isolated from one another. In the last two or three years there have been signs of an easing of the tension, and with moves to establish a common curriculum in basic subjects, some of the rigidity has been eased out of the system. Yet, despite reforms of structure, there is evidence of a malaise within French education which, it is the contention of this article, derives largely from a contradiction between the epistemology and consequent pedagogical methods of the teachers and the economic and social motives behind the reform movement.

Underlying Philosophy

Traditional concepts of learning derive from an idealistic view of man and a static view of society. Since the time of Descartes and the Jesuit colleges man has been defined by his ability to intellectualise, and by an assessment of his digestion of the cultural patrimony. 'The culture which he (the pupil) is to receive is first and foremost a heritage, a heritage organised from our knowledge of the material universe, of human societies, their character and historic evolution, a heritage too of the great traditions of our humanism which over the centuries has allowed man to promote his material and moral condition . . .'* The ideal human culture was the total of human knowledge, hence children should acquire the maximum baggage of knowledge to stay with them through life. This ideal entailed evading the demands of social and professional life; it aimed to create the man, not the producer or the citizen. While discussing the question of professional training Durkheim observed: 'It is not sufficient to possess technical ability, more important is to be able to think, exercise judgement and reason. A certain development of the faculties of reflection, of the speculative faculties is wholly indispensable.' Again he speaks of 'the necessary objective of secondary education which consists essentially of awakening the speculative faculties, of exercising them, of fortifying them in a general manner without ever engaging them in any professional task.' A hierarchy of studies was therefore built up with the linguistic and literary disciplines, based on the classics, at their head. Mathematics was highly valued, but only as a training in exactness and logic. Science was held in low esteem. A voluntary absence of commitment reinforced the intellectualism of the schools, and it was felt to be the task of the family to give the child a coherent system of values. Each subject

* Ministerial Circular, *Les buts et les méthodes de l'enseignement du 2nd degré* 29 September, 1952.

discipline, being conceived as a separate branch of learning, tended to form an entity within itself, remained hermetically sealed from contact with other disciplines, and was fiercely defended by the subject teachers. With the explosive increase of human knowledge, timetables have become impossibly overcrowded, and yet the pupil was expected to synthesise the separate packages in the traditional manner.

Although this view of knowledge applied particularly to the academic secondary schools, elementary education inevitably reflected this philosophy without however providing the essential elements of prestige culture. Its methods too were authoritarian and verbal, with little recourse to experiment or the concrete. Formal classroom exercises, copying and dictation, learning by rote, and group repetition were commonplace. From the teacher's point of view there were the advantages of clarity and ease of organisation. However the method favoured the child who was docile, patient, and a good listener, verbally precocious and a sound memorizer who accorded importance to scholastic success. Unfortunately it mitigated against the dreamer, the timid or the clumsy, or those whose interest was in the concrete or in life outside the classroom. Where secondary education aimed to produce a student with sensitivity, a capacity for observation, taste and reason, primary education contented itself with dispensing facts and basic skills.

Anatomy of the Teacher

Such a view of education, in both elementary and secondary sectors, required a teacher of a certain type. He functioned as a 'master' who transmitted knowledge in accordance with a strictly laid-down programme, with an examination as the ultimate goal, and with educational progress for the pupils being conceived in linear terms. The teacher assumed a hierarchically superior role in isolation before a potentially hostile class, transmitting by exposition what he himself had acquired through study. His knowledge of psychology was generally limited to the scientifically dubious concept of mental faculties. His hierarchical superiority, however, was only valid as regards the academic, not as regards life in general. Families did not question his authority regarding instruction, but retained the right to educate, in the sense of transmitting values, hence the remoteness between school and home. Such teaching is extolled by the educational writer Alain who rejected the need for reform. He declared that a child's true nature desired to cast off its childlike status and to attain adulthood. He condemned interest as a motivator of learning, and idolised the bare classroom walls which would not distract pupils from their studies. He abhorred the idea of pupil guidance and the diversification of courses. 'Napoleon expressed in two words what every man must know to the fullest: geometry and Latin.'

The training of teachers translated and perpetuated this concept of their role. The *professeur* had to attain an exacting academic standard to gain his degree, and would frequently feel that training in pedagogical method added little to his professional abilities. Profound love for, and knowledge of, his discipline was sufficient. In fact the elite of the profession, the *agrégé*, had only four weeks of contact with schools before finally qualifying. Since 1952 teachers with degrees have been required to take the CAPES* which includes some pedagogic training and a year's supervised teaching. But inspectors and older colleagues have

* *Certificat d'aptitude pour l'enseignement secondaire.*

tended to perpetuate the attitudes and methods which they themselves respect. The *instituteur* at training college undoubtedly learned more of pedagogic theory, but for this very reason he has been looked down on by the *professeurs*. Nevertheless, even here, the possession of academic diplomas was held to be the most important qualification for his work. Proper vocational training has always been resisted or denigrated. The result is a profession based on caste, where respect and esteem depend more on diploma and degree than on the work done. The recent reforms and the shift in educational thinking are forcing on the teachers a change of role for which their traditional attitudes and training have left them ill prepared.

Changes of Aim

The teacher is not now dealing with the same pupils as in the past, and, particularly in the traditional academic courses, he does not enjoy the same ideological support from family, society, or even pupil. Despite the efforts to preserve the traditions of the *lycées*, secondary education has become a mass education, and for many pupils it has become a terminal education which cannot afford to ignore the demands for a more vocational orientation. The *baccalauréat* will have to assume a new function, that of school leaving certificate, and even the prolongation of compulsory education to 16 can only hope to be a success if the schools establish contact with, and prepare for, life in the world outside. For now concepts of the relationship of man and society have been revised. The old static hierarchies have been partially destroyed, and class and social barriers have shifted and become blurred. A fuller and more rounded concept of the well educated man has coincided with the explosion of scientific knowledge which has rendered the world less stable, and with an aspiration to participate, which is manifest at most social and political levels.

Teachers are therefore faced with objectives and responsibilities far different from those of fifty years ago. Recently there have been efforts to redefine general culture. It has been argued that any subject could contribute to culture if taught well. Although deep reservations persist about the need for a basic core of learning, a comprehensive body of knowledge is no longer felt to be necessary or possible for all. Several bodies of knowledge are appropriate, of which technology could be one. 'It (technology) can constitute a mode of educating the mind which would be of equivalent value to that of any other traditional intellectual discipline.'* Yet such thinking still leans heavily on faculty psychology, and scarcely answers the need for a dynamic education in which the findings of modern psychology and sociology play an important role. The thinking of M. Faure, who was M. Peyrefitte's successor, would seem, despite its implicit intellectualism, to be more in tune with France's needs. 'Culture must essentially be dynamic . . . culture is a seeking after the full realisation of personality. Culture will not then be the acquisition of knowledge, since knowledge in any case changes, it will be essentially the acquisition of the capacity to acquire knowledge and to assimilate it.'*

The task, however, is more prosaic and concrete. The teachers in the classrooms will have to change. Teaching children to think intellectually will not be enough; they will have to be prepared for living in a

* M. R. Bertrand, Directeur du lycée technique d'Auxerre, *Education*, No. 14, 1968.

changing world, hence barriers between school and life, general and vocational education will need to be broken down; other activities such as sport and music will need to be the concern of the school. Not only will the teacher be transmitting something of the pupils' cultural heritage, but he will also have to help them find full personal development, which will inevitably mean that elitist concepts will be undermined to the advantage of the mass of the school population. Specialist subject teachers will have to concern themselves to some extent with the pastoral side of their pupils. For too long teachers have thought that dispensing information and general culture would suffice, and relied on rules, programmes, and prescribed texts to help them. This attitude is at the root of the gap between writings of eminent educationists and the sterility of much of the teaching. The hierarchical relationship between teacher and pupil will have to be modified, with a greater emphasis on common aims and activities, and on the social education of pupils. Authoritarian relationships are not compatible with a climate of creativity, co-operation, and constructive work, which mass education must surely demand if it is to be successful in preparing pupils for later life by a full development of their potential.

Effect on Teachers

In April 1968, a series of discussions was held at Amiens where educationists thrashed out the problems of reform. One of the subjects was: 'The teachers must be themselves reformed. It is one of the fundamental conditions for the existence of an educative community.' One of the study groups reported as follows: 'Pedagogic flexibility, decentralisation, opening up the schools to the outside world, the suppression of the notion of the class as it is now used . . . will oblige the teacher to effect a complete mutation. He will have to move from an institutional individualism (scarcely tempered by the class councils on which he already sits) to team work. He will have to change his role of one administered to that of co-administrator. In fact the teaching body will no longer constitute the limit of his professional contacts; he will have to collaborate, enter into a dialogue with outside specialists, with parents, psychologists, doctors, child guidance experts . . . and with pupils.'* Speaking in the National Assembly some months previously, M. Peyrefitte had shown that he too was aware of the revolutionary demands to be made of the teachers: 'A master is not a true educator if he is simply content to do his marking. The real master . . . is not solely preoccupied with what his pupil does, but with what he is, with what his needs are, with his family, with his strengths, his weaknesses, his successes and failures. He advises him. He guides him. He encourages him to form for himself the power of judgement and a sense of purpose.'†

The final declaration at Amiens affirmed the urgency of the problem of pedagogic renewal, urging research projects to be set up at once. Teachers were urged to stop thinking such ideas to be peripheral and irrelevant. The educational administration, heavily centralised and rigid, has been attacked as a major stumbling block. 'One could claim that every stage of the current reforms constitutes an experiment in itself; in our meaning of the term this is not so, for each new endeavour, by virtue of excessive centralisation which characterises our administration, immediately enforces on the whole country elements of a solution,

* *Education Nationale*, No. 858, 1968.

† *Education Nationale*, No. 829, 1967.

which, through not being perfected by previous experiment on a reduced scale, make manifest their inevitable faults and often produce a set-back instead of an improvement; this fact ultimately condemns each decision to a certain timidity, for the slightest initial error inevitably leads to catastrophic consequences.'* There was a serious danger of teachers becoming cynical and lacking in interest and instead of participating in reform simply putting up with it. M. Peyrefitte therefore, early in 1968, proposed to the Council of Ministers a plan for research and pedagogic renewal. A committee was to be set up to look into the general orientation of studies and research relevant to education. It was to make proposals for research co-ordination on a medium and long term basis, with a view to throwing light on the problems arising from the reforms. Audio-visual aids, team teaching, pupil-teacher relationships, relevance of subject matter, were all to be subjects for experiment. Yet professional reaction was unenthusiastic.

Since May 1968

The explosion of May 1968 profoundly shocked the teaching profession. The demands of the *lycée* pupils reflected entirely the strictures which had so frequently been aimed at the teachers. They wanted the hierarchical relationship between teacher and pupil to be replaced by one of co-operation, where the term 'master' would be replaced by director of studies or interlocutor. The following declarations were typical: 'The teaching we receive develops to excess the spirit of analysis to the detriment of the spirit of synthesis.' Or again: 'The pupils wish to be represented on all councils dealing with the internal organization of the *lycées*.'† One of the more liberal of the teaching unions, SGEN, admitted that the crisis had arisen because reforms of structure had been superimposed on a system whose basic philosophy had not changed. It considered the obstacles to be administrative inertia, the dead hand of routine, the impersonality of gigantic establishments, and the lack of men and money; it demanded an attack on the deep seated causes: 'only this approach will enable us to prevent justified discontent being exploited by a minority.'‡ The fear, well justified, was also expressed that the hotheads in the lycée pupil organisation might well have swung certain teachers against further reform and into a more defensive frame of mind.

Writing in *Esprit* J. J. Natanson analysed at some length the causes of the revolt. He too criticised the rigidity of the administration, but was even more stinging in his attack on the teachers who should in fact have been the initiators of reform. 'The teaching body has remained inert and passive in the face of change, it has criticised—and usually with justification—the reforms imposed upon it, but it has itself neither made any serious proposals nor put any reforms into effect.' He blames the conservative nature of teacher training which has hardly changed for a century, and which has produced a teaching profession which prides itself on its Left Wing politics but which objectively does the work of the Right through its high regard for selection and competitiveness, its authoritarian teaching methods, and its consequent unwillingness to adapt to the needs of working class children.

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* Dr. B. Meyer, *Education Nationale*, No. 775, 1966.
† *Education Nationale*, No. 866, 1968.
‡ *Education*, No. 10, 1968.

M. Faure, the new Minister, immediately launched a number of projects to help remedy the situation. He spoke of abolishing the CAPES and the *Agrégation*, and establishing a single mode of recruitment for secondary education. The resultant outcry forced him to have second thoughts. Again, a ministry circular 6.1.1969 recommended a change in marking, with the aim not of measuring a pupil's performance in competition with his fellows but in relation to his own abilities. The approach was to be qualitative rather than quantitative. Yet if such a change were to work, it would demand a complete transformation in class teaching. M. F. Gaussen, writing in *Le Monde*, was very doubtful about its possible success. 'The effective working of this new pedagogy can only be assured by an intense effort in the field of information and collective work. Long experience testifies to the following fact: no circular, however pertinent it may be, has ever been sufficient to modify reality unless it is accompanied by a strategy and concrete policy of action. The latter would seem as yet to be ill-defined.'

The hearts and minds of French teachers have not been won, and there is widespread talk of a malaise still gripping the profession. More than a year after May 1968 an article in *Le Monde* noted a marked slackening in the momentum and enthusiasm engendered in many people by the riots, and although M. Olivier Guichard's goodwill was not called into doubt, the writer was cautious about his ability to effect the required changes. 'The will towards transformation which then showed itself—compounded of the enthusiasm of some and the resignation of others—has considerably diminished: there is the discouragement of many when faced with the concrete difficulties of change, a powerful resurgence of conservatism, a withdrawal by the teaching unions to their traditional positions in defence of corporate interests, the action of Leftist groups which has become more aggressive as they feel themselves ever more isolated.'

The educational renewal will not be possible without the complete collaboration of the teachers. Yet the wholesale abandonment of the French intellectual tradition will be neither possible nor desirable. But if this tradition is not to degenerate into sterility, it will have to be rethought in terms of an industrialised society in which hierarchies are not rigid and where individual citizens are both encouraged and educated to participate constructively at all levels. The social aims implicit in the restructured schools will have to be reflected in a new educational philosophy, involving changes in the curricula, teaching methods, in the relationships between school and society and perhaps most important of all in the relationships between teachers and taught.

This article begins an occasional series on educational research in university departments. The editors will be glad to consider similar contributions from other centres.

Educational Research at Lancaster

N. J. ENTWISTLE

N. J. Entwistle is Professor of Educational Research at the University of Lancaster.

Teacher opinion is commonly critical of the research efforts reported in the literature. The statistical presentation is often complex and the problems seem to be either abstruse or excessively narrow, even trivial. There is a real problem here; it is not simply a matter of ignorance or of ivory towers. The research worker will generally take a problem of practical significance to the teacher or at least make his starting-point some aspect of children's behaviour. But if there is to be any certainty at all in the findings, the approach thereafter must be what may loosely be called 'scientific'. Measurement will play an important part, as will careful sampling. In setting about the collection of data, the research worker will have to obtain or devise suitable instruments, perhaps tests or questionnaires. He will then decide what to measure partly on the basis of previous research findings and partly from his knowledge of what can, at present, be effectively measured. Here is the rub; the dimensions chosen for measurement will have to be precisely defined and hence rather narrow, perhaps deriving more from psychological or sociological research than from the terms commonly used in the classroom. Sampling is essential to ensure that the results will be representative. It is important to establish general relationships, not those which hold in a particular class for a single teacher. Statistical analyses then show us to what extent the results may safely be generalised, or to what extent our findings have been limited by doing research on a particular group. When it comes to reporting what has been done, other research workers must have the opportunity to check and to criticize the method—hence the need for technical reports. But in spelling out the practical implications of the findings, problems multiply. The results will inevitably be expressed in terms of the tests used for measurement and not in common parlance. To move back from psychological dimensions to classroom terminology is often extremely difficult; it involves the risk of making unwarranted assumptions about what has really been measured. Adding to this the tendency for research workers to adopt scientific caution and qualify the implications in many ways, some of the reasons for communication gaps between researchers and teachers are apparent.

At Lancaster we cannot claim to have solved these problems; we are at least sufficiently aware of them to be looking for solutions. This article is intended to provide a brief over-view of educational research being carried out in the department. As generally happens in universities the work in the major projects has often been preceded by individual research carried out by both staff and graduate students. For simplicity, however, the sponsored research provides the structure of this summary.

Classroom Interaction

It is surprising just how little is known in detail about what takes place in classrooms. Teachers can certainly get the feel of a class, can sense its corporate personality. But much of the work nowadays, particularly at the primary stage, involves individual work by the child. In moving round the room the teacher will stop to answer a question, will enquire about difficulties, may administer a reproof. But is this process systematic? Does the teacher interact more with some children than with others? Do different teachers adopt different approaches in talking to pupils? To some extent these questions can be answered by casual observation, but to find the reasons underlying differences in teacher-pupil interactions, systematic observation and elaborate recording techniques are necessary. Considerable effort has been put into developing appropriate observation methods, starting with classes of infants. Already interesting differences can be seen. Some children appear to spend long periods of time almost unnoticed by the teacher; others attract considerable attention. Teachers vary in the extent to which they move around the classroom and in their typical ways of talking to their pupils. The implications of these observations are now being considered.

This research is still a pilot study, but if the techniques prove successful, the information could have an immediate impact on teacher training. If we are to help students adapt to their role in the classroom, it is essential to know more about the processes of give and take between teacher and pupils.

Curriculum Development for the 'Middle Years'

One of the earliest projects set up in the department, with the backing of the Schools Council, has the broad task of looking at the whole curriculum of the middle years of schooling. It was asked to consider approaches to learning appropriate to this age group having in mind changing views about the content of the curriculum, experience of inter-disciplinary work, the opportunities created by middle schools and the need to ease the transition from primary to secondary school. Although the emphasis is on 'practice', the project necessarily has a strong 'theory of education' side. Consideration of 'the whole' involves an identification of the parts; the number of parts and their relative sizes is in turn arrived at only after judgements have been made on what the educational system is for and more precisely on how each particular school sees its function within the total operation. In other words 'aims and objectives' are being explored and the various practices which flow from prior decisions about objectives are being examined.

Although the team has had wide teaching experience, the particular judgements required were sufficiently difficult to necessitate a larger scale investigation of opinion and practice, drawing evidence from primary, secondary and middle schools. Extensive use has been made of teachers' centres. Discussion documents have been sent to these centres; primary and secondary teachers discussed the problems raised and reported their conclusions to the team. Visits have been made to a large number of schools deemed by various authorities to provide examples of different kinds of 'good practice'. Drawing together theoretical ideas, teachers' opinions and observation will provide the findings of the project, but the report will not attempt to

provide any uniform solution. It will indicate a framework for discussion in the belief that solutions to specific problems will be found in the experiences of others, presented with a rationale derived from educational theory.

Most Schools Council projects produce materials; the middle years project has no trial materials or pilot schools. It deals in ideas, strategies, judgements and plans. Its work is intended to stimulate discussions among teachers about the approaches to teaching most suitable for the 8–13 age range, without making assumptions about the type of school in which the teaching would take place. The particular value of the project may be in the way in which teachers from both primary and secondary schools have come together in groups all over the country to discuss common problems. If the final report provides, with its blending of theory and 'good practice', a stimulus for a continuation of these discussions, its outcome will have been successful.

Personality, Achievement Values and School Attainment

The value of fundamental research is difficult to anticipate in advance. Some results may have an immense impact on educational thinking and practice, others, probably a large majority, will have little direct influence on teaching. Basic research is justified by its ability to build up important new ways of thinking about education, but it is inevitably a slow process; and its pay-off may not be easy to demonstrate. In a world which is 'productivity' conscious and is increasingly interested in immediate material reward, there is a danger that fundamental research will be neglected. It clearly is of great importance that development work and applied research should be encouraged, but not by *every* grant-giving body. In the past it has been clear that the DES and the Schools Council have emphasized applied research, while the Social Science Research Council have sponsored a good deal of basic research. The aftermath of the Rothschild Report may alter this balance significantly, but at present we are able to do a certain amount of fundamental research at Lancaster unfettered by the demand to demonstrate immediate relevance.

The SSRC has, for example, set up a project to investigate psychological factors associated with creative writing. Recently there has been considerable interest in the extent to which school attainment may be related to personality and in particular to the dimensions of extroversion and emotional stability. It has been shown that stable extroverts are more successful than other personality 'types' in primary schools, but introverts, and even unstable introverts, do particularly well at university level. But previous research had defined 'attainment' in primary schools along rather traditional lines. The starting point of the current research was the possibility that children who wrote imaginatively might have different personality characteristics from those who did well on formal tests of English. It already is becoming clear that the particular personality type which emerges as being 'successful' will depend not only on the form of assessment, but also on the style of teaching which has been adopted in the classroom.

The measurement of personality also plays a part in another piece of research. The attitudes of adolescents towards school are of perennial concern to teachers, but it is far from clear to what extent these attitudes reflect values held by parents and other adults. Pupils and their

parents have been given questionnaires to determine to what extent achievement values are shared. Ambition, comfort and an easy life, intolerance, occupational involvement, family loyalty and cynical fatalism have all been found to contribute either positively or negatively, to a definition of achievement values. It will be interesting to examine the extent to which values are shared between parents and children, between pupils in the same class and between teachers and pupils. It is also intended to examine the personality characteristics of children whose values are noticeably discrepant from those of their parents. Again practical relevance is not far removed from these analyses, although the starting-point was an interest in the concomitants of achievement values among adolescents.

Examinations and Nuffield Chemistry

Our department at Lancaster also has a strong interest in methods of assessment both in higher education and in schools. One particular project is concerned with Nuffield 'A' level chemistry examinations which differ from traditional examinations in a number of respects. Their content and objectives are subject to quantitative specification and a variety of relatively novel procedures have been applied. Objective tests, structured questions, impression marking and the internal assessment of practical work by teachers form the greater part of the examination. The present form of the examination was evolved during two years of school trials, but a systematic investigation into its operation within the GCE system has not yet been carried out.

The present investigation is inquiring into the operation of those examination techniques which are largely untried at 'A' level. The internal assessment of practical work, for example, will be the subject of feed back from teachers and enquiry will be made into the effects of applying different moderating instruments to the teachers' marks. Much of the work will involve analyses of answers to all the questions in the written papers, relating these to the content and objectives of the course. The conjunction of a quantitative examination specification with a statement of objectives of the course makes this type of operational research possible for the first time at 'A' level. It will enable precise statements to be made about attainment of objectives, relative performance between objectives, and relative performance between categories of students.

In addition to its immediate value in monitoring attainment within the Nuffield course, it is hoped that this investigation will lead to a general improvement in assessment techniques in 'A' level science. Evidence at the operational level is important at a time when several examining boards are seriously considering the introduction of new techniques.

Finally this pilot study will demonstrate the way in which examination performance can be used to monitor course design. From this beginning a standard monitoring system might evolve for the many new science courses which are likely to arise at this level in the future.

Training Teachers for Primary and Middle Schools

Collaborative research involving staff at three local colleges of education has been made possible by a DES grant to support and evaluate an innovatory course in 'applied education'. Briefly the guiding principle of this course is to provide a practical but theoretically and academically rigorous course for students wishing to enter primary or middle

schools. The course will replace the traditional 'main' and 'subsidiary' subjects, which are normally taken alongside the study of education. As the University offers a 'double education' option in the B.Ed., students taking the new course will still be able to graduate with honours.

The curriculum for applied education requires students to select six modules from a range of options available. The modules on mathematical education and English are compulsory, while the remainder include French, music, art, drama, moral education and environmental sciences. The objectives for each module are expressed in terms of the day to day work of practising teachers and it is required that in each module the work will cover exceptional children, as well as children falling within the normal ranges.

The problems of attempting to evaluate the effects of such a course are considerable. In the event a group of about 20–25 students will take the applied education course in each college and they will be compared with a similar group of students who continue to take the normal course. There are, of course, many factors which cannot be controlled in the evaluation procedures, for example, the enthusiasm and commitment of the lecturers concerned with introducing the new course, and the reasons why the students decide to opt for the innovatory course. (Random allocation to groups cannot be used, where the outcome could affect a student's subsequent career.) However the evaluation will examine whether the students who opt to take the applied education course appear to behave differently as teachers from those students who continue to take the normal course. We shall be interested in seeing whether these students are more successful in acquiring a range of specific skills related to teaching. Ideally we would like to examine whether students who have taken the applied education course become more effective teachers in the long-term, but there are grave difficulties in deciding precisely what is meant by the term 'effective', once the students have become established as teachers. Nevertheless attempts at evaluation are crucial in the development of curricula at any level, in spite of the problems involved.

The Future Structure of Higher Education

There has been considerable discussion in the press about ways in which the system of higher education may have to be modified in the future. The trustees of the Joseph Rowntree Memorial Trust anticipated this concern by initiating research aimed at producing evidence on which future discussion could be based. They were interested in selection for universities and in the extent to which the educational objectives of the different sectors of higher education actually overlapped. The research has thus been in two parts. The first is a follow-up study of some 2,600 students from twenty institutions—universities, polytechnics and colleges of education. The aim is to identify the characteristics of students who are successful in different areas of study and in different types of institution.

The second part of this study concerns aims and objectives. A thorough review of the literature has been supplemented by an opinion survey among lecturers to see the extent to which institutional objectives are translated into appropriate teaching strategies. Lengthy interviews have already been completed with some 40 staff in four institutions and interesting trends emerge. While lecturers are clear that universities

and colleges are necessarily very different types of institution, the descriptions of the teaching strategies used by lecturers in comparable departments of both colleges and universities appear to be rather similar. It was also found in preliminary analyses of data from the follow-up study that the characteristics of successful students, and their approaches to studying, apparently differ much more between disciplines than between the sectors of higher education.

Research Centres

The research which has been summarized in this article highlights two tendencies. It is important to recognize that the division between pure and applied research is difficult to draw with any confidence. Applied research can develop theoretical insights, while basic research may well produce results of practical importance. The approaches are complementary, although the starting points may be widely different. Perhaps the most important tendency of all is for teachers and college of education lecturers to be drawn into the research activities of the university. In the past, except in isolated cases, active co-operation has been lacking and the quality of the research has suffered as a result.

In the quinquennial plans of Lancaster University is a proposal for a centre for educational research within the School of Education. It is hoped in this way to formalise the developments made possible in various separate projects into a continuing activity. If it is possible to appoint research staff to such a centre, their advice and encouragement would be available to teachers and college lecturers in the area. Pure and applied research might both develop out of wide discussions and teachers might then be more ready to accept the results emerging from such research.

In the future it is possible that similar centres might be established throughout the country, giving teachers access to local advice about research. Such a network of centres might usefully be linked to the NFER to facilitate the organisation of national surveys and the rapid dissemination of important research findings. The activities of research centres, working in conjunction with teachers' centres, might prove a most effective way of overcoming many of the communication problems between research workers and teachers which were mentioned earlier. There is a growing need for co-ordination in educational research and for the active involvement of teachers in major research studies.

Anyone interested in further details of the projects described above should contact the Department of Educational Research, Cartmel College, University of Lancaster.

TREND-SETTER

Team Teaching in Combined Arts

In a north western secondary school an experimental arts course has been run for fourth year leavers. It was first agreed by the staff concerned that one whole afternoon per week for 70 pupils and four teachers should be devoted to 'combined arts'. The head of the English department and teachers of music, art and girls' PE were involved in this arrangement.

It had been hoped to start the afternoon with a movement session for everyone in a blacked-out hall, with spotlights and music. Equipment problems and the temporary absence of a key member of staff ruled this out. To launch the first theme 'conflict' a film was shown and on this theme, music, drama and art groups worked for three weeks creating songs, improvising dramatic episodes, exploring rhythmic possibilities in sound and movement. The pupils proved to be co-operative but short on ideas. The presentation to the whole gathering of the individual groups' results seemed at first, except in the case of the art work, insurmountably difficult. But the experiment continued. Two of the more successful enterprises are described here by Richard Hargreaves, head of the school's English department. He adds a comment on the problems which had to be met and overcome.

'We showed the 20 colour slides of car-wrecks to a Bartok accompaniment, twice, and this inspired some effective writing immediately after the viewing.

> CAR DUMP
> Old, mangled, defaced and defeated, there is a strange quietness in the air as you walk through the heaps of junks. The whole place is still and silent. Your hand touches a rough patch of rust and it falls to the ground a fine powder. Windows are shattered, cracked, scratched and gone to show their innards, burnt paint, plastic, rubber and cloth. Wires hang from burnt-out panels, loose, limp and tangled like specimens of modern art.

After three weeks' work, that is three Wednesday afternoons, we had our 'sharing'. We mounted an exhibition in the hall of the fine drawings and very exciting junk sculpture, dramatically lit by spotlights. The musicians had chosen six slides and composed a sequence of percussive 'moments musicaux' to accompany them. These were played live, despite difficulties caused by the absence of crucial performers (this was another perpetual problem). In drama we had created a human junk-heap, a kind of hell where a wide section of society's drop-outs and rejects gathered and raggedly chanted their junk-heap song. One verse was

> Nothing for rent,
> Nothing for booze.
> Society calls us
> A load of screws.

This was an exciting occasion, though we began to be haunted by visions of what could have been achieved by more responsive pupils.

After a term of 'social realism' we were determined to escape, and January brought a Beowulf epic, perhaps the most ambitious and successful project of the year. We darkened a classroom, played eerie music, and sitting under a green spotlight I read, as evocatively as I could, Ian Serraillier's translation of Beowulf's fights with Grendel and his gruesome mother. Reception was mixed and the writing afterwards dismal, entirely my fault; among about six suggestions for writing, in an attempt to help those who had remained unimpressed by the reading, I had suggested 'A Frightening Walk', or something equally silly. Ninety per cent chose this and I drowned in a torrent of cliché terror.

Over the next few weeks the dance and drama had their moments of inspiration,

though the end product was disappointing because as usual it was impossible to polish the work. The music seemed to me to be splendidly successful, weird janglings to suggest the uneasy atmosphere at Heorot, fine thumpings for the fight, a wonderfully rhythmic victory dance and a real brassy march tune for Beowulf to parade to with Grendel's arm held high. The art work, however, was the highlight to my mind, and if the whole course needed a justification this would provide it.

After several weeks' work we all went down to the art room to meet Grendel and other assorted fiends. Framed by prints of hideous monsters, stared at by a huge outline of an alarmingly sad face which was modelled in white plaster on a black square, and illuminated by two red spotlights, Grendel towered over us, slightly forward, a gaunt six foot figure of tubes and white sacking with the leanest and hungriest of looks. His arm, impressively out of proportion because it was made by another group, rotated bloodily on the ceiling, stick fingers one end and gory sinews the other.

Everyone wrote describing the scene most people meaningfully, and all my English classes were taken that week to meet Grendel. My art colleague is emphatic that this week could not have been done without the kind of elaborate stimulus that teachers working together can provide.

Our main problems were the difficulty of getting ideas from pupils and our inability to develop some of the work from one week to the next so that they could experience a real bringing-together of the arts in a performance. Two other difficulties have been the disruption of Wednesdays by school events and the most infuriating one of all, that of getting the four of us together at one time to talk about and plan the work. Communication seems a fundamental problem in many, if not all, schools, and even in a small school like ours (c. 700) there seems to be no time when we are all available. The very nature of our subject specialities seems to involve us in lunchtime and 4 o'clock activities, so meetings of any length or depth have to be at home late in the evening. We have been allowed on Wednesdays to finish 15 minutes early and send our pupils home so that we can talk about it all, but this time is so often spent in recuperation or tidying-up that it is not in fact the best time to discuss things.

Another problem, in the creative music-making with pupils of limited ability, is the wearying effect of sheer noise and the rather saddening fact that while most pupils can achieve something in rhythms and noise-making it is only those few who have been in the choir or the band who can make tunes on the melody instruments.

Despite the doubts and difficulties, I feel we are attempting something tremendously worthwhile. I know for certain that the highlights of this year could not have been achieved in the normal segregated boxes of art, music, PE and English.

Beginning Reading

Vera Southgate
University of London Press
Unibook.
£1.95. (paper £1.25)

The book is a collection of papers presented to conferences and articles written for journals between 1963–1970. Each paper or article forms a chapter and all focus on the initial stages of reading. This format does not lend itself to continuity of argument and inevitably leads to some repetition. However, each chapter shows a decisive and clear cut approach to problems of beginning reading.

There are three sections in the book. In Part One the need for thoughtful selection of appropriate approaches and for some

degree of structure in reading tuition is emphasised. This section contains an admirably lucid description of 'Approaches to Beginning Reading in Great Britain'—a subject to challenge the powers of synthesis of any writer. Part Two is primarily concerned with the development of new media for beginning reading. It contains the main points of the evaluation of ita carried out with Professor F. W. Warburton and a comparison of ita with three colour codes. The final section examines factors within the dynamic classroom situation which affect reading progress and suggests how a simple formula could describe the interrelatedness of these major influences. This may be a little too simplistic but nevertheless the section highlights the need for research in reading to take cognisance of situational variables.

Throughout the book a concern for structure in reading tuition emerges clearly and insistently. This feature is likely to provoke much discussion among teachers. 'Structure' has come to have certain emotional overtones which might suggest that children were being overdirected or strait jacketed by methods contrary to heuristic approaches. The author is fully appreciative of such methods and feels they cannot operate with maximal effectiveness unless reading skills are acquired.

Mrs Southgate suspects that within the framework of 'discovery' methods children are not being given sufficient guidance in reading and that greater structuring of the total reading environment could facilitate their progress.

Obviously structure can have many meanings. Mrs Southgate refers to ways of regularising the written code and 'devising a master plan of reading tuition with built-in diagnostic and recording devices'. It is argued that since English is a non-regular sound-symbol system which most children cannot learn to decode unaided, recently devised systems which simplify this code should be carefully examined by teachers. Such systems tend to be neglected although the more regular the medium, the greater possibility of children 'discovering' rules and generalisations themselves. It is also suggested that whatever approach to reading is used, teachers should develop master plans involving clear ideas of aims and 'detailed plans of exactly what has to be learned and the order and progression of the small steps which lead to the ultimate goal'. Presumably this would be flexible enough to meet individual requirements since the need to diagnose difficulties and record individual progress is also stressed.

Mrs Southgate may become suspected of recommending action which is not seen to be in line with the current emphasis on creative elements in learning. However, it does no disservice to such approaches to suggest that new systems should be thoughtfully appraised and that they may have something to offer—systems can be used as formally or informally as the teacher interprets them. Nor is it unreasonable to recommend that teachers have clearly defined plans of action with sufficient flexibility to meet individual differences so that children may be helped towards acquiring a complex skill.

This book will be valuable to teachers and students. The ideas are expressed with clarity and directness. They will probably provoke discussion but if either dissension or agreement leads to increased 'reading drive' within schools Mrs Southgate will probably feel that her efforts were justified.

S.G.

Deschooling Society

Ivan Illich
Calder and Boyars
£1.95

The attractive qualities of this extraordinary little book are self-evident and sufficient to arouse an initially warm response in the most hardened heart. Illich is on to something big and what he has to say is always attractively and persuasively put. How relevant is his thesis for us in England?

It is to be noted that Illich left Europe at the age of 25, a priest. We know that he was recently in Cyprus, talking with Richard Wollheim and other philosophers (the record of this conversation in *The*

Listener of 16 December 1971, is an important addendum to the book), but we might guess that he has not been much in Europe during the last twenty years. The insights and the social vision which Illich radiates derive from experience of the USA and the Third World, particularly the societies of central and south America. There is a natural tendency to dismiss his doctrines as wholly irrelevant to the institutions and practices of contemporary Europe. But two thoughts intervene—first that it was from Russia where his analysis seemed so remote that effective operational response to Karl Marx actually came. Secondly that in the Open University we already have in this country a learning system on the Illich pattern.

Illich picks on the school as the most insidiously divisive of social institutions and that which more than any other promotes the competitive, consumer-dominated ethics of western capitalism. Except for their vulnerability it is not quite clear why schools are chosen, rather than trades unions, courts of law or security forces. In England children have been known to demonstrate on behalf of their school and teachers, but obviously with less force and conviction than other demonstrators. 'School is not yet organised for self-protection as effectively as a nation-state or even a large corporation', writes Illich. 'Liberation from the grip of schools could be bloodless.'

The arguments against school which burst from the circle of Americans to which Illich belongs are now fairly well known. Books by Paul Goodman and Everett Reimer are published as Penguins and were reviewed in *Trends 25*. Interest mainly centres therefore on what is proposed instead. The aim of the deschoolers is to provide access for all to four types of educational resource which Illich calls—things, models, peers and elders. 'Things' include the goods stored in libraries or labs for exclusive educational use or available in farms, offices and factories for occasional use by students when not required for production. 'Models' are people who possess skills and are willing that others should learn from them at specified times. Arrangements for access would be secured by means of an educational communications network. Twiggy could become a model in the Illich sense if her telephone number was fed into it. This network is vital to all deschooling proposals as it is also indispensable to the process of 'peer-matching' by which those who want to learn find congenial partners in their enquiries. 'Elders' are the educational consultants or counsellors such as the Open University provides.

For all the eloquence and insights, the gentle but determined qualities of Illich's mind, there is something curiously harsh and dry about his thoughts—so much about the system and an absence of any reference to the observation, let alone the teaching, of any actual child. The Illich world, judging from this book, contains no women and no children except an eleven-year-old boy in Mexico, who is not 'afflicted with the yearning for childhood'. Surely this puts him (together with Dickens' Bitser in *Hard Times*) among those who behave as the grown-ups want them to and get credit for it. One cannot help feeling that Illich is just as prone to ignore or bully children as the rest of us. 'No one can be excused if he fails to liberate himself from schooling'—an excellent warning to the fifth former but a bit grim when applied to a child—so also seems the plea for tax rebate to employers willing to use eight and nine year-old child labour.

We learn from the introduction to 'Deschooling Society' of the apparently all male group (there are about 20 names) amongst whom in Cuernavaca the ideas of the book were discussed. It seems as if the women and children are safely stowed away in the boats to perform, as women do, most of the essential tasks on which society depends including that of teaching the children. Meanwhile in all their male pride the men stand fast on the deck of the sinking ship arguing with cool deliberation about what ought to be done next.

D.M.H.

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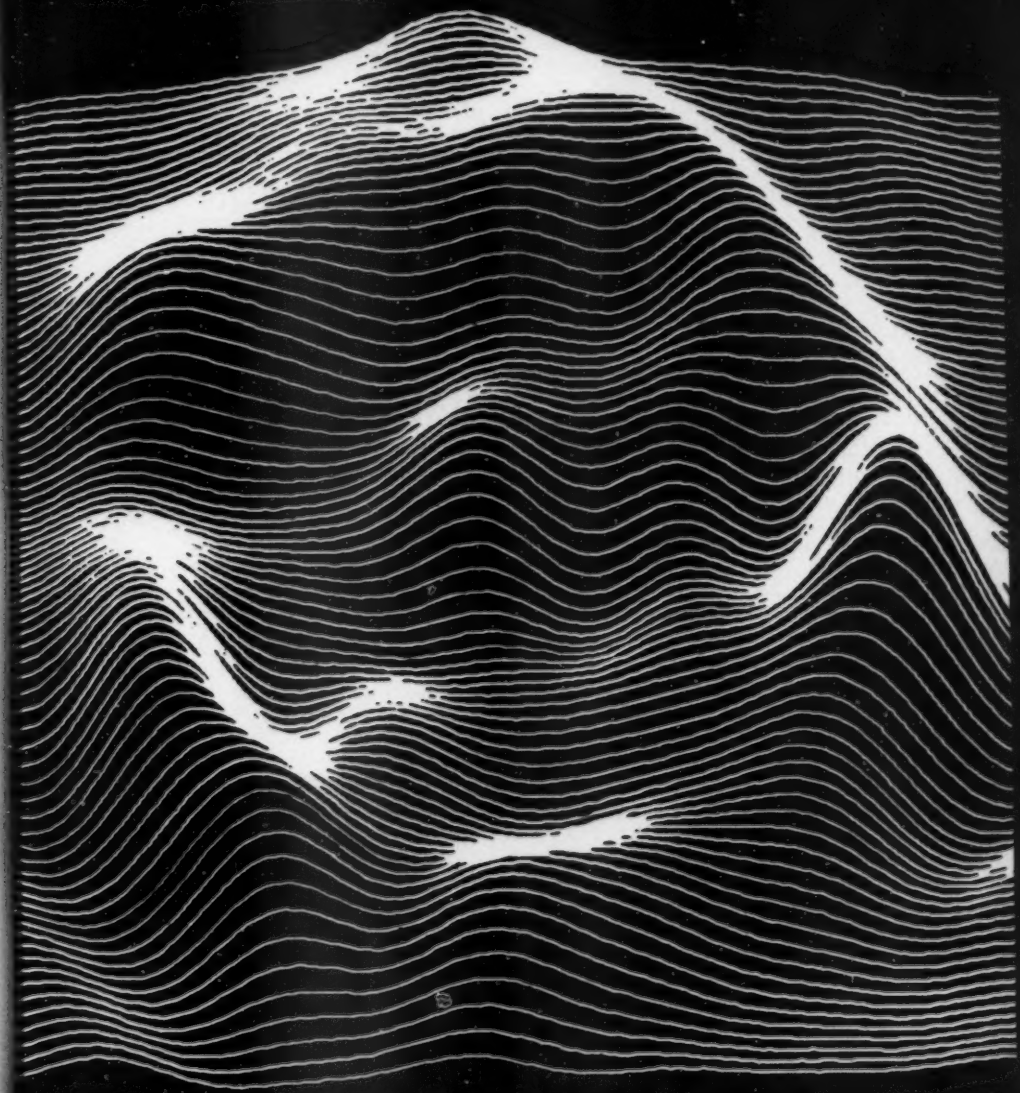
GROWING POINTS IN SCIENCE



Sixteen eminent scientists were asked by the DES to contribute essays to a book about recent advances in which British research work has played a leading part. The result was 'Growing Points in Science' a paper-back of 215 pages with 52 illustrations, price 60p. from:

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